# Southwestern Medicine

OFFICIAL ORGAN OF
ARIZONA STATE MEDICAL ASSOCIATION
NEW MEXICO MEDICAL SOCIETY
EL PASO COUNTY (TEXAS) MEDICAL SOCIETY
THE MEDICAL AND SURGICAL ASSOCIATION
OF THE SOUTHWEST

Volume XV | FEBRUARY, 1931 | No. 2

ANNUAL SUBSCRIPTION $2 | SINGLE COPIES 25 CENTS

Entered at the Postoffice at Phoenix, Arizona, as second class matter.
"Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized March 1, 1921."


## ACUTE CRANIOCEREBRAL INJURIES


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(Read before the Annual Meeting of the Medical and Surgical Association of the Southwest, at El Paso, Texas, Nov. 6-8, 1930).


Because of the increasing incidence of acute craniocerebral injuries, the importance of an adequate understanding of these lesions is today emphasized more than previously. The present day conception of craniocerebral injuries differs considerably from that held prior to the last two decades. Prior to this time more attention was paid to the injury of the cranium, which was considered the all-important phase of craniocerebral injury, than to the injury of the brain, which is contained within the cranium. Even though at the present time the degree of cerebral injury is considered as the all-important factor in craniocerebral injuries, by most physicians, there is still the tendency among laymen and insurance companies, and, unfortunately, among certain of our fellow practitioners to place more stress on injuries of the rigid skull than injuries of the delicate cranial contents, the brain. This differentiation may appear to be a didactic point, because, as a rule, an injury which is severe enough to cause a fracture of the cranium will also produce cerebral injury. The symptoms, however, in such a case are due to the cerebral injury, and it is the cerebral injury which requires treatment much more than the lesion of the cranium. On the other hand, simple fractures of the skull do occur in which there is no cerebral injury, and, vice versa, extensive cerebral injuries may be present without any concomitant lesions of the cranium. In a series of autopsies reported by Vance, with special reference to fracture of the skull, brain lacerations were found even though a fracture of the skull was not present. In Vance's series of cases these were invariably produced by contrecoup violence, usually resulting from a fall. In a series of 441 cases of craniocerebral injuries reported by McClure and Crawford, 172, or 39 per cent, were associated with skull fracture.

### ETIOLOGY

The etiology of craniocerebral injuries varies as time progresses, the automobile becoming relatively more frequent as the cause of craniocerebral injuries each year. Vulliet found that the percentage of craniocerebral injuries admitted to the hospital in the "pre-automobile era" (in the years 1896 and 1897) was 0.86, whereas the percentage of these cases admitted in recent years (in the years 1927 and 1928) was 2.5, a relative increase in the number of craniocerebral injuries of about four times. In a series of 530 cases of craniocerebral injuries, reported by Crandon and Wilson in 1906, a fall was the etiological factor in 80 per cent, whereas, in McClure and Crawford's recent presentation, the automobile was responsible for 54.2 per cent of the injuries, falls and blows 20 per cent and 18.4 per cent, respectively.

### CLASSIFICATION

I. Those with cerebral injury with or without cranial injury.
   1. Concussion
   2. Edema
   3. Contusion
   4. Laceration
   5. Hemorrhage
      a. Intradural
      b. Extradural

II. Those without brain involvement.
   1. Scalp wounds
   2. Skull fracture
      a. Vault

b. Base
c. Simple
   (1) Linear
   (2) Comminuted
d. Depressed
e. Compound

CONTUSION

**Cerebral Injuries**

There is considerable controversy at the present time among physiologists, clinicians, and pathologists concerning the use of the term, concussion. The controversy has arisen largely because of the indefiniteness of the term. If it is kept in mind that concussion is a clinical syndrome which is based upon no pathologic findings, but is based upon definite clinical symptoms and signs together with a typical clinical course, its use seems justifiable. Concussion is in reality a physiologic and not an anatomic lesion, in that no changes can be demonstrated in the cerebrum. Miller defines concussion as a condition which ic sharacterized by a "group of symptoms which are the result of a temporary inhibition of cortical function with or without stimulation or inhibition of one or more of the medullary centers, but which are not accompanied by pathological lesions."

Concussion is characterized by immediate and temporary unconsciousness, usually followed by headache, nausea, and occasionally vomiting, with rapid recovery from all symptoms. Whereas, most patients with concussion as a condition which is characconcussion recover, it not infrequently occurs that patients die without recovering consciousness and in whom at necropsy no gross lesions can be demonstrated. Supposedly, these individuals die from the same condition which produces concussion. In McClure and Crawford's cases, there were 351 cases of concussion, 257 of which were associated with skull fractures and ninety-four associated with no skull fractures. In a series of 507 autopsies reported by Vance, death from cerebral concussion occurred in 139, or 27.4 per cent: eighty-six died within a few minutes; thirty-four in from one to four hours; eleven in from five to ten hours; and in eight the duration was unknown.

The necessity of recognizing concussion of the brain is particularly important in order that proper therapy may be instituted. In all individuals in whom unconsciousness has occurred, irrespective of the length of time which it has persisted, a period of rest is imperative in order to prevent sequelae developing.

**Edema**

Edema of the brain has been recognized by pathologists for a long period of time. Its significance has not been appreciated by clinicians until relatively recently, since the introduction of the dehydration therapy, which is directed entirely against the "wet brain." LeCount and Apfelbach, in a study of 504 postmortem examinations of patients with craniocerebral injuries, state that the most frequent change in the brains of patients dying with fracture of the skull was traumatic edema of the brain. They describe the convolutions as being flat and the cerebral veins relatively empty and flat, the fluid in the leptomeninges being decreased. Apfelbach, two years later, in describing the edema of the cerebrum associated with craniocerebral injuries, states that it is a generalized edema and not a localized one associated with contusions. Edema in Apfelbach's series of cases was found most frequently in the brains of persons who died within the first two or three days after the accident. Green emphasizes the importance of cerebral edema and the necessity of its prompt treatment. He states that relatively slight injury to the cranium of individuals suffering from cardiorenal disease, is sufficient to produce cerebral edema. That the majority of symptoms in craniocerebral injury are the result of increased intracranial pressure, is accepted by most authorities today. This increase in intracranial pressure is, in by far the majority of cases, the result of cerebral edema, which in a relatively short time, produces a vicious circle, i.e., as the result of the increased intracranial pressure there is interference with the venous return, which hinders absorption of the cerebrospinal fluid. This produces an increase in the amount of cerebrospinal fluid. As the condition progresses the arterioles become compressed, producing a cerebral anemia.

**Contusions**

Contusion of the brain frequently follows trauma to the head. According to LeCount and Apfelbach, from their study of 504 postmortem examinations, the most frequent type of contusion is wedge-shaped in which the brain is infiltrated with blood for a depth of from 2 to 4 cm. over an area of from 4 to 5 cm. This type was found in 49.2 per cent of their series, in 73.3 per cent of which number it was a contrecoup injury. Contusions occurred in only 7.03 per cent of McClure and Crawford's cases, which, however, were observed clinically and not at necropsy. Contusion is of importance because it is frequently the cause of death. According to Vulliet, massive cerebral contusion was the

cause of death in 18.7 per cent of ninety-six cases observed by him, whereas, Trotter is of the opinion that contusion of the brain is probably the most common cause of death and that most of the symptoms produced by cerebral injury are the result of contusion. Symonds differentiates between a major and a minor type of contusion, the difference being one of degree. He considers clouding of the consciousness or stupor as a distinguishing feature of major contusions. Patients with minor contusion complain, however, of headaches, giddiness, and mental disability.

### Lacerations

Laceration of the cerebrum represents a more extensive injury than contusion, even though its differtiation from contusion may be an artificial one, the difference being largely of degree. It is, however, deemed advisable to consider lacerations separately, especially in those cases in which there is definite tearing of the cerebral substance as contrasted with the bruising which occurs in contusion. According to Blahd, laceration is usually associated with or dependent upon fracture of the skull. In McClure and Crawford's series of 441 cases of craniocerebral injuries treated at the Henry Ford Hospital, there were fifty-four with laceration of the cerebrum, five without skull fracture, and forty-nine associated with fracture. In addition, there were five cases of laceration and hemorrhage, all associated with skull fracture. In 504 necropsy examinations of patients with craniocerebral injuries reported by LeCount and Apfelbach, severe laceration of the brain measuring 4 cm. in diameter and extending into the brain substance for from 4 to 5 cm. was found in sixty-four instances (slightly over 10 per cent), and all except eight were contrecoup injuries. Bagley believes that lacerations of the cortex are the result of direct force of the blow and may be associated with simple or compound fractures of the skull, but frequently occur without fracture of the skull. Vance classifies cerebral lacerations in skull fractures into direct lacerations and contrecoup lacerations, of which the contrecoup occurs more frequently than the direct. In LeCount and Apfelbach's and Vance's series, contrecoup laceration occurred as a rule when the skull, as a moving object, struck against a surface. This is explained by LeCount and Apfelbach by the fact that, in the motion of the head, the brain lags behind the more rapidly moving cranium and at the moment of the impact the brain is closer to the cranium opposite to the place where the violence is applied.

### Hemorrhage

Hemmorhages associated with craniocerebral injuries are of two types, intradural and extradural. Associated with all cerebral injuries from the slightest contusion to the more extensive laceration, there are varying degrees of hemorrhage. Intradural hemorrhage occurs as a result of cerebral contusion or laceration, whereas extradural hemorrhage occurs as a result of injury to the middle meningeal artery, or rarely the lateral venous sinus.

Localized Hemorrhage. Because localized hemorrhage is so amenable to surgical therapy, the relative importance of this type of lesion probably has been overemphasized by surgeons. However, this type of lesion occurs much less frequently than do the other types of lesions above discussed. In ninety-six cases of craniocerebral injury reported by Vulliet, a localized hematoma occurred in only two instances. Massive hemorrhage associated with cerebral lacerations occurred in only five of McClure and Crawford's 441 cases of craniocerebral injuries. In Vance's 512 necropsies, 132 deaths were caused by subdural hemorrhage, the majority of the patients dying within twenty-four hours. In 132 cases the hemorrhage was produced by contrecoup lacerations in eighty-five cases, by direct laceration in twenty-one cases, and by contrecoup and direct laceration combined in twenty-one. Vance considered a case as having subdural hemorrhage whenever there was enough hemorrhage to produce compression of the brain. The average weight of the subdural hemorrhage was 61.1 grams. In 100 per cent, 73.8 per cent, and 84 per cent of fractures in the anterior, middle, and posterior fossae, respectively, in Vance's series, a subdural hemorrhage was found. The importance of subdural hemorrhage and the presence of blood in the spinal fluid has been emphasized by Bagley, both from an experimental and clinical viewpoint. Bagley found, experimentally, that blood in the subarachnoid space produced spasticity, sterile meningitis, and in young animals caused a dilatation of the lateral ventricles. Essick, prior to the work of Bagley, found a similar reaction of the meninges to the injection of laked blood with the production of a sterile meningitis. Subdural hemorrhages are of importance, not only because of the immediate symptoms which may be produced, but because of subsequent lesions. Fay and Winkelman have emphasized the importance of diffuse collections of cerebrospinal fluid over the cerebral cortex following subdural hemorrhage with resulting cerebral atrophy as the result of

pressure. In addition to the diffuse type of fluid collections following subnormal hemorrhage, the localized lesion first described by Virchow, which is a cystic formation on the base of a localized hematoma, may occur. Valuable contributions to the question of subdural hematoma or chronic hemorrhagic pachymeningitis have been made by Naffziger, Grant, and Rand.

Extradural Hemorrhage. Extradural hemorrhage is of less importance than subdural hemorrhage in so far as it occurs much less frequently. However, because of the marked increase in intracranial pressure which is produced by an extradural hemorrhage and because of the fact that it is especially amenable to surgical treatment, the possibility of an extradural hematoma should always be considered. The hemorrhage usually occurs from the middle meningeal artery or one of its branches. Extradural hemorrhage occurred in 39.4 per cent of the necropsy series reported by LeCount and Apfelbach. In only 52.2 per cent of this group, however, was the hemorrhage large enough to produce an appreciable compression of the brain. Of the large extradural hemorrhages, 70.1 per cent were associated with fracture of the middle fossa; 14.4 per cent were associated with the posterior fossa, 9.6 per cent were associated with fracture of the vault, 2.8 per cent fracture of the anterior fossa. In a series of 507 cases observed at necropsy and reported by Vance, extradural hemorrhage was described in only 106. Only sixty-one of these (12 per cent of the latter) however, were large enough to prove fatal through cerebral compression. The greatest number of extradural hemorrhages occurred, in Vance's series, between 30 and 40 years of age, which he believes is due to the fact that the dura is just adherent enough to the skull to allow laceration of the artery, but not adherent enough to prevent its separation from the bone. The extradural hemorrhage in Vance's series of sixty-one cases, originated in the posterior branch of the middle meningeal in twenty-five, the anterior branch in twelve, the main stem in four, in an unstated branch of the middle meningeal in fifteen, the anterior meningeal artery in one, and the lateral venous sinus in four.

## INJURIES NOT INVOLVING THE BRAIN

### Scalp Wounds

The importance of scalp wounds in acute craniocerebral injuries has not been sufficiently appreciated by the medical profession. Weaver emphasizes the proper care of scalp wounds and considers them as potential brain abscesses, as they are frequently the sites through which organisms can gain entrance to the cerebrum. Of 520 cases of cranial fracture reported by McCreery and Berry, in 216 there was an associated scalp wound, thirty-seven of which communicated with the fracture. Sixty per cent of 6,117 cases of skull fracture reported by Stuart, were associated with lacerations of the scalp, ninety-eight of which occurred in the frontal region, 130 in the parietal, eighty-eight in the occipital, and 55 per cent in the temporal area.

### Fractures of the Skull

Fractures of the Vault. There is considerable variance among authors concerning the relative frequency of fractures of the vault. In general, however, it might be said that the statistics based upon necropsy investigations show a relatively low percentage of skull fractures involving the vault. In Vance's series of 512 cases, the vault was involved in only 6.7 per cent, whereas the vault and base were involved in 91.9 per cent. In LeCount and Apfelbach's series, the vault was involved in 9.9 per cent and the base in 89.8 per cent. In a clinical series, however, vault fractures occur more frequently than basal fractures, probably because the basal fratures are not diagnosed because of the difficulty in demonstrating basal fractures roentgenologically. In McClure and Crawford's series of 441 cases, 85.7 per cent were fractures of the vault and only 5.7 per cent were fractures of the base alone. Stewart states that 70 per cent of the linear fractures of the vault extend to the base by the shortest route. Vance explains the higher percentage of basal fractures as compared with those of the vault on anatomical grounds. The vault is stronger and is of even thickness with the exception of the temporal region. The base, however, is of irregular, flat construction, composed of heavy masses of bone weakened by thin plates. He believes, as does Stewart, that in most instances fractures begin in the vault and extend down to the base. They course along between the strong masses of bone and are directed toward the central part of the skull.

Basal Fracture. Basal fractures are frequently overlooked because of the difficulty in diagnosing the condition, largely because of inconstant and indefinite radiographic signs. As evidenced from necropsy examinations of Vance, LeCount and Apfelbach, basal fractures, either alone or associated with fractures of the vault, are the most frequent type of fracture of the skull. In Vance's series of cases, the posterior was involved in 34.8 per cent of the entire group, the middle fossa in 45.2 per cent, and the anterior fossa in 11.9 per cent. In LeCount

and Apfelbach's series, the anterior, middle, and posterior fossae were involved in 12.1, 32.9, and 35.3 per cent, respectively. Because basal fractures are apt to extend either into the nasal accessory sinuses or into the middle ear, the danger of secondary infection of the meninges is especially great, which point has been emphasized by Newell. Prognosis should be more guarded in basal fractures, not only because of the danger of infection, but because of associated injury to the cortical centers. Of thirty-nine fractures of the vault reported by Blahd, there was a mortality of 13 per cent, whereas in twenty cases of fracture of the base, there was a mortality of 65 per cent.

Of the various types of fractures, simple fractures occur most frequently. A simple fracture may produce no symptoms and be of no clinical significance. In fact, the only significant feature about a simple fracture of the skull is an associated cerebral injury. However, compound fractures are of definite significance because of the danger of the introduction of micro-organisms into the wound with subsequent infection. The proper care of compound fractures has been stressed by Cushing and others. Of thirty-seven operations performed by Thorning for 100 cases of acute craniocerebral injury, 51 per cent were performed for compound fractures. Compound fractures are, therefore, of surgical interest. Depressed fractures are also distinctly surgical and require operative intervention. The fragment, because of its direct pressure on the cervical corteix, may give rise to very definite symptoms. Bagley is of the opinion, however, that if the dura remains intact, the depression may be of little significance. Depression occurred in 198 of the 408 fractures of the vault reported by Stewart, and in only 5.1 per cent of 520 cases reported by McCreery and Berry.

## DIAGNOSIS

The diagnosis of acute craniocerebral injuries is extremely important. A great deal can be learned from the history. Of paramount importance is the presence or absence of consciousness, as extensive cerebral injury is always associated with unconsciousness. McClure and Crawford believe that the degree and the duration of the primary unconsciousness serve as a fair index to the severity of the injury and probable subsequent course, except in hemorrhage and infection. One of the diagnostic features of concussion is immediate unconsciousness, which is invariably present. In McCreery and Berry's 520 cases of skull fracture, 178 were conscious and rational, twenty-three were stuporous, and 218 were in coma, on admission to the hospital. The clinical syndrome, as described by Kocher, of temporary unconsciousness followed by a lucid interval, later followed by unconsciousness, is characteristic of a rapidly increasing intracranial pressure of a severe degree, which is almost invariably associated with intracranial hemorrhage, usually from the middle meningeal artery. These cases are, however, relatively rare as compared with the large number of acute craniocerebral injuries. The pulse rate is of diagnostic value in acute craniocerebral injuries.. Newell places it second to the history. We now know that too much importance should not be placed in the pulse rate as there may be little alteration in the pulse early in the condition, changes in pulse rate being the result of considerable cerebral damage and indicating an advanced lesion. It is probably of more value as a prognostic agent than as a diagnostic agent. In Ritter's series of 349 cases of concussion of the medulla oblongata, there was a slightly increased pulse rate in 57.9 per cent. The pulse rate was normal in 40 per cent. There may be considerable variation in the pulse rate of a patient on his admission. This becomes self-evident when it is kept in mind that many patients with acute craniocerebral injuries are in shock when admitted to the hospital. Characteristically, the pulse in shock is of a small volume, and the rate is usually increased, which is dependent upon the condition of shock and not dependent upon the cerebral injury. In cases with marked increase in intracranial pressure as seen in hemorrhage from the middle meningeal artery, the pulse becomes definitely slowed due to compression of the medullary centers. This, however, represents an advanced lesion and is always associated with a marked increase in intracranial pressure. Associated with bradycardia is a definite increase in the blood pressure and unconsciousness. This symptom complex should never be waited for, and the diagnosis of increased intracranial pressure should be made before the symptoms present themselves.

Miller believes, from his experimental work on cerebral concussion, that the determination of respiratory rate is of a great deal of significance in cerebral concussion. He was able to demonstrate experimentally that the respiratory center was affected earliest of all the medullary centers by cerebral injury. In less extensive injuries the result was stimulation of the respiratory center, with an increase in respiratory rate as well as an increase in amplitude. As the injury becomes more severe, there results a paralysis of the respiratory centers, with

cessation of respiration. Miller believes that this respiratory paralysis is responsible for the sudden death in concussion. Newell states that, as the intracranial pressure becomes increased, respirations become labored and slowed.

Of primary importance, as far as diagnosis is concerned, Newell believes, is the temperature. In Besley's series of 1,000 cases of skull fracture, the average temperature of those patients who recovered was 100° F., whereas, that of those who died was 102° F. Symonds is of the opinion also that, early in cerebral injuries, the temperature is decreased. In considering temperatures in craniocerebral injuries the possibility of subnormal temperature as the result of shock must always be kept in mind.

Careful physical examination of the entire body, provided the patient is not in extreme shock, will yield considerable information concerning the nature and the extent of the cerebral injury. In such examination, special care should be paid the ears, nose and mouth, in order to determine whether or not there is evidence of escape of blood or spinal fluid. Hemorrhage from these natural orifices, unless there is an obvious wound from which bleeding may occur, is indicative of basal skull fracture. Ecchymosis may occur around the eyes or behind the ear or over the mastoid process (Battle's sign). The prognosis is much worse in those cases in which there is hemorrhage from the ear, nose and mouth, because of the possibility of infection gaining entrance to the meninges as a result of the compound fracture. Schuster states that middle ear fractures have a poor prognosis, because this portion of the temporal bone does not heal well, which may result in a permanent communication from the middle ear to the meninges. According to Davis, hemorrhage from both ears is an especially unfavorable sign, the mortality from his series being 66 per cent, whereas hemorrhage from one ear was associated with 39 per cent mortality. The danger of meningitis is especially great in those cases in which there was previous infection of the middle ear, mastoid process, or nasal accessory sinuses. In addition to hemorrhage and discharge of cerebrospinal fluid from the ear, Schuster states that in about 40 per cent of all head injuries there are other symptoms referable to the ear; i.e., impaired hearing, dizziness, and tinnitus. A careful neurological physical examination is extremely important, which is to be repeated frequently in order to observe the progress made by the patient. In McClure and Crawford's series and McCreery and Berry's series of cases, the seventh and eighth nerves are most often affected in the acute craniocerebral injuries, whereas in most authors' experiences, the sixth cranial nerve is the one most frequently involved. In McCreery and Berry's series of 520 cases of skull fracture, a negative neurological examination was found in 127, cranial nerve paralysis occurred in fifty-eight cases, and spinal nerve paralysis in eighty-eight. The superficial reflexes were decreased in fifty-eight; the deep reflexes were decreased in sixty-three and increased in seventy-nine. Abnormal reflexes were present in sixty-two.

Of extreme importance as regards the extent of injury, the progress of the case, and the prognosis, are the eye manifestations. Changes in the pupil are of great diagnostic and prognostic significance. According to Lyerly, the size of the pupil normally seldom varies in the two eyes. He quotes Barrie, who found, on examination of 326 recruits with apparently normal eyes, an inequality of the pupils in about 10 per cent. Characteristic of pupillary changes in acute cerebral injury is the variation seen on repeated and frequent examination. McClure and Crawford recommend frequent eye examinations, because of the frequent changes which are apt to and do occur in severe acute craniocerebral injuries. In their series of cases, the pupil was dilated on the side of the lesion, and in all patients with dilated and fixed pupils a fatality resulted. Holman and Scott state that a unilateral dilatation and fixation of the pupils almost invariably occurs on the side of the lesion, and sometimes in cases of progressively increasing cerebral compression from hemorrhage.

The eye manifestations are extremely important as regards prognosis. Of 610 cases of fracture of the skull observed by Blakeslee, 78 per cent showed eye signs. Of those with widely dilated and fixed pupils, 94.5 per cent died. Of those with widely dilated pupils which reacted to light, 30 per cent died. Of those with unilateral dilated and fixed pupils, 6 per cent died. Of those with unequal pupils, however, without a great deal of dilatation or contraction, 44 per cent died. Of those with pupils contracted and fixed, 70 per cent died. Nicols believes that fixation of the pupil is much more serious than inequality. In fifty-four cases with a nonreacting pupil with fracture in the vault, forty-seven died, and in twenty-four cases in which the pupil did not react, all died. In Walton's series, thirty-nine out of fifty fatal cases of acute craniocerebral injury had fixed pupils. All of McClure and Crawford's patients with dilated and fixed

pupils died. Nystagmus was observed in fifty-three patients of Stewart's 617 fractures of the skull, of whom thirty died and twenty-three recovered. Nystagmus was toward the injured side in twenty-six cases and toward the opposite side in eleven cases. value of eye-ground examination in cranio- Of the 610 cases of fracture of the skull reported by Blakeslee, only thirteen, about 2 per cent, showed nystagmus. Four of these patients, however, died.

There is some controversy concerning the cerebral injury. In Blakeslee's series of cases, papillitis with slight swelling of the vessels, together with slight edema and obliteration of the disc margin, was recorded in only eight of the 610 cases of fracture of the skull. Thirty-nine per cent of these patients, however, died. Thorning is convinced that eye-ground examinations are of relatively little value. In four of the twelve cases examined by him, the fundic changes were definite, but in these cases the clinical signs were so pronounced that the condition of the optic disc did not influence the treatment. Other cases were found in which the signs were indefinite, from the standpoint of eye grounds, but in which other signs were very definite and in which, at operation, lesions producing increased intracranial pressure were present. Gunn, on the other hand, believes that early changes in the optic disc are of value. He states that there is no noticeable change within six hours following injury. The first change is an increase of the retinal vein, which is accompanied by a hyperemia of the disc and followed shortly by an edema of the nasal half of the disc. According to Gunn and Cohen choked disc is never seen in cases of acute craniocerebral injury. In Cohen's series of the twenty-four fatal cases the fundus was normal in eight, neural retinitis in three, mild papillitis, bilateral, in three, mild papillitis, unilateral, in one, moderate papillitis, one, retinal hemorrhage, two, no examination, five; the fundic changes in the nonfatal cases, normal thirty-five, unilateral primary atrophy three, mild papillitis three, unknown, seven.

### Blood Pressure

To Kocher belongs the credit for calling attention to the so-called stage of compensation in which, as the result of anemia of the medulla, produced by a rapidly increasing intracranial pressure, there is a blood pressure rise. Up until the last decade, considerable dependence was placed upon blood pressure readings in cases of acute craniocerebral injuries. It is now realized, however, by most clinicians, that little dependence should be placed upon blood pressure and that when blood pressure changes do occur as the result of cerebral compression, considerable damage has been done to the cerebrum and medullary centers. Blood pressure readings are, of course, invaluable in the diagnosis and in determining the progress in cases of acute craniocerebral injury in which there is an associated shock. Bower found that there is no constant direct relationship between the cerebrospinal pressure and the blood pressure. Holbrook has observed many cases in which there was marked increased intracranial pressure where there was no significant blood pressure change. The unreliability of placing too much dependence on blood pressure in the diagnosis of acute craniocerebral injury has recently been emphasized by Gage, and, aside from the condition of shock, it would probably be better if blood pressure readings were not made. By this statement, I do not wish to decry the value of blood pressure readings in general. However, there is danger that, if blood pressure determinations are made, too much importance will be placed upon their value by immature house officers, and more difficult, yet more valuable, diagnostic procedures will be omitted.

### The Spinal Fluid

Of greatest importance from a diagnostic and prognostic point of view, is the determination of the cerebrospinal fluid pressure, as well as the character of the fluid. As the immediate symptoms in acute craniocerebral injuries are the result of increased intracranial pressure, except in those cases where there has been extensive injury of the cerebrum, a knowledge of the cerebrospinal fluid pressure would be of great value as regards diagnosis, prognosis and treatment. Jackson, in 1922, reported his results in 100 cases of acute cranial injuries in which spinal fluid pressure determinations were made and in which spinal tap was used therapeutically. Cerebrospinal fluid pressure was above 30 mm. of mercury in 14 per cent, the highest reading being 60 mm. In 34 per cent, the pressure was between 20 and 30. In 44 per cent, the pressure varied between 10 and 20. In a series of 316 cases admitted to the Boston City Hospital and analyzed by Munro, lumbar puncture was performed and manometric readings of the cerebrospinal fluid pressure were made in thirty-six. In the cases that recovered, the highest pressure recorded was 60 mm. of mercury, the lowest was 4, and the average 16. In seven fatal cases the highest pressure was 100 mm. of mercury, the lowest 10, and the average 39. In comparing the differences in cerebrospinal pressure in cases of craniocerebral injuries between the white

and colored races, Weaver found that, among 300 cases occurring in the white race, there were 190 cases of hypertonicity, as compared with 218 cases among 300 occurring in the colored. Connors believes that a diagnostic lumbar puncture should be made routinely in cases of acute craniocerebral injuries. Holbrook and Symonds are of the same opinion. McClure and Crawford are of the opinion that lumbar puncture should be done only when there is a definite indication. They state that it should be done slowly and cautiously. In their series of 441 cases, lumbar puncture was performed in 148 cases, or 33.6 per cent: 47.3 per cent had pressures under 10 mm. of mercury; 39.8 per cent, from 11 to 20; 10.8 per cent, from 21 to 30; and 2 per cent, above 30 mm. of mercury. In Munro's series of cases, the comparison of the spinal fluid pressures in the fatal and nonfatal cases reveals that the average intracranial pressure is nearly two and one-half times higher in the fatal cases than in the nonfatal. Even though it is desirable to perform a lumbar puncture and determine the amount of cerebrospinal fluid pressure as soon as possible after an acute craniocerebral injury, this procedure should not be performed in the presence of shock, which is generally accepted by most authors. Aside from the fact that patients in shock bear any operative manipulation poorly, lumbar puncture performed at this time is of relatively little diagnostic aid, as, even in those cases in which there is extensive cerebral injury, the cerebrospinal fluid pressure is apt to be normal or decreased, because of the decreased arterial and venous pressure. Aside from the determination of the cerebrospinal fluid pressure, a knowledge of the character of cerebrospinal fluid is of great value for prognosis and treatment in craniocerebral injuries. In 39.9 per cent of the 148 cases in which a lumbar puncture was done in McClure and Crawford's series, the spinal fluid was bloody, and it was clear in 60.1 per cent; 83.3 per cent of the cases in which death occurred showed bloody fluid. Aside from indicating the severity of the lesion, blood within the cerebrospinal fluid is of importance as far as subsequent sequelae are concerned. Essick found experimentally that, when laked blood was injected into the subarachnoid space, there occurred within six hours a definite sterile meningitis. Bagley was able to demonstrate experimentally that blood injected into the subarachnoid space of dogs produced marked systemic changes. Immediately after the injections the animals became spastic and recovered from the narcosis slowly. In the adult animals there frequently followed convulsive changes and frothing of the mouth. They were hypersensitive and irritable and the nutrition was poor. In the puppies the most startling effect was noted, in that there was a diminished activity and a poor development. Late in the course of the meningeal reaction changes in the cortex were observed. In six out of nineteen puppies in which blood was injected into the subarachnoid space and on which autopsies were performed, a definite dilatation of the ventricles was found. Fay has described a type of cerebral atrophy which is due to collections of fluid in the subarachnoid space, the result of subarachnoid hemorrhage.

In contrast to the above mentioned authors, there are certain authorities who believe that lumbar puncture is dangerous and should not be performed in cases of craniocerebral injury in which an increased intracranial pressure is suspected. These authorities believe that, because of the sudden decrease in the intraspinal pressure, the herniation of the medulla into the foramen magnum may occur. McClure and Crawford believe that lumbar puncture should be done only in selected cases and the fluid should be withdrawn slowly and carefully. Henschen is of the opinion that lumbar puncture is dangerous in increased intracranial pressure and should never be used. Besley believes that lumbar puncture is not free from danger. Sachs is also definitely opposed to lumbar puncture in acute craniocerebral injury.

### Roentgen Ray

The relative importance of roentgenography in the diagnosis of craniocerebral injuries is a matter of controversy. It may be stated, however, that all cases of acute craniocerebral injury should have roentgenograms of the skull for two reasons: (1) in order to eliminate the possibility of a depressed fracture, a knowledge of which is absolutely essential in order that the correct and proper therapy be instituted; (2) because of the high regard which the laity and the legal profession have for cranial fractures, a failure to obtain a roentgenogram in a suspected cranial lesion, especially in a medico-legal case, would indicate, at least in the eyes of a jury, improper care of the patient. It must not be forgotten, however, that, aside from depressed fractures, the most important lesion in craniocerebral injuries is not the injury to the cranium but the cerebral lesion. Roentgenograms, also, are not infallible, even in those cases of cranial fracture, as illustrated by the following studies: In Stewart's series of 617 cases of cranial fracture only 73.1 per cent of the

fractures showed positive x-rays, and 26.8 per cent were negative. In the latter group, 10.7 per cent showed linear fractures at the time of operation and 12.3 per cent were diagnosed as basal fractures by other signs and symptoms, 11.6 per cent were found to have basal fractures at postmortem examination, 2 per cent proved to be fractures of the vault, which were slightly depressed when the wound was explored.

## TREATMENT

### Immediate Treatment

Within the past decade the general trend has been toward conservatism in the treatment of acute craniocerebral injuries. Prior to this time, because of the relatively greater importance attached to localized intracranial hemorrhage, operative procedure for the relief of intracranial tension was practiced rather frequently. At the present time it is realized that, in by far the greater majority of cases, the increased intracranial tension is the result of edema which is dependent upon the cerebral trauma.

The difference in treatment practiced today from that practiced a decade ago is illustrated by the following figures: Sharp operated upon about 30 per cent of his craniocerebral injuries; Welinsky, 24 per cent; Heuer, 22.7 per cent; Naffziger, 20 per cent; whereas Crawford and McClure, in their series of 441 cases, operated upon only 4.3 per cent of the cases. It is now generally accepted that, in the majority of cases of craniocerebral injury, conservative treatment is not only less dangerous but is more efficacious than operative interference.

As many patients with acute craniocerebral injuries are in surgical shock when first seen by the surgeon, it is imperative that the shock be treated before the institution of any other therapy. The patient should be immediately put in bed, external heat should be applied, and hot fluids administered. The administration of hypertonic glucose solution intravenously is justifiable, because, not only is it of value in combating shock, but it is also of value in preventing and combating cerebral edema. Any external wound should be cared for as soon as possible, although undue manipulation is to be avoided until the patient reacts from shock. As soon as the patient's condition permits, an examination—especially a neurological examination—should be made, especial care being paid to the cranial nerves, pupillary reflexes, evidences of discharge of blood or spinal fluid from ears, nose or mouth, evidences of paralysis of weakness. Even though these findings may not be abnormal, a record is extremely important in order to determine whether any deviation from normal subsequently occurs. Lumbar puncture should be performed as soon as the patient recovers from shock, both as a diagnostic and therapeutic procedure. A cerebrospinal fluid pressure higher than 10 mm. of mercury should be considered abnormal and enough fluid should be removed cautiously to decrease the pressure above 10 mm. of mercury by one-half: i.e., if the cerebrospinal pressure is 20 mm. of mercury enough fluid should be withdrawn to reduce the pressure to 15 mm. of mercury. Roentgenograms of the skull should be made as soon as the patient recovers from shock, in order to determine the presence of a depressed fracture. As recommmended by Weaver and Davis, in those cases in which there is discharge of blood or cerebrospinal fluid from the ears, no attempt should be made to irrigate the external auditory meatus, because of the danger of introducing infection into the meninges. However, the external auditory meatus should be plugged with sterile cotton, possibly saturated with alcohol. In those cases in which there is a compound fracture or in which there is an injury to the scalp without injury to the underlying bone, active therapy is of utmost importance. As emphasized by Cushing during the World War, in compound fractures, especially those following gunshot injuries, the treatment consists of debridement, removal of the traumatized cranial tissue by means of suction, following which the wound is tightly closed. Weaver is especially emphatic in emphasizing the necessity of debridement because he considers wounds of the scalp as potential brain abscesses. The frequently employed use of morphine and other narcotics is mentioned only to be condemned. In acute craniocerbral injuries such drugs should never be used unless the patient is uncontrollable. Because of their depressing effects on the cerebrum, symptoms may be masked. Weaver also believes that morphine should not be used for severe headache, because the drug depresses respiration. McClure and Crawford state: "In the early stages we do not use morphine as a sedative or homatropine as a mydriatic for fear of masking important signs. Bagley prefers coal tar products and bromides to morphine for the control of restlessness and delirum.

### Repeated Lumbar Punctures

As early as 1905, Quincke emphasized the importance of the determination of the cerebrospinal fluid pressure and stated that the best results in the treatment of these conditions was by lumbar drainage. Rawling was of the opinion that, in spite of the apparent advantage of lumbar drainage, it was of little value in reducing intracranial pres-

sure. More recently, however, due largely to the work of Jackson and Munro, the advisability of lumbar puncture in the treatment of acute cerebrospinal injuries has been especially stressed. In 1922 Jackson reported 100 cases of acute cranial injury in which cerebrospinal fluid pressures were determined and which were treated by repeated lumbar punctures. He advocated performing lumbar puncture at intervals of six to twenty-four hours. Munro treated sixty cases of acute craniocerebral injury by lumbar puncture alone with only seven deaths, a mortality of 12 per cent. Bagley stresses the importance of not performing spinal drainage in those cases in which pure blood is present within the subarachnoid space. He believes that in this type of case it is better to wait until the blood becomes mixed with the cerebrospinal fluid before attempting spinal drainage, as the prognosis in the former case is very bad. Worster-Drought, McCreery and Berry believe that repeated spinal drainage is of more value than the use of hypertonic solutions in the severe cases. They have not hesitated to remove slowly enough fluid to lower the spinal fluid pressure down to 10 mm. of mercury. In none of their cases did this require the removal of more than 50 c.c. of fluid. Green also believes that enough spinal fluid should be removed to decrease the spinal fluid pressure to 10. Holbrook, McClure and Crawford are less radical and remove smaller amounts and do not decrease the cerebrospinal fluid to such a degree. Repeated lumbar punctures are of value in acute craniocerebral injuries, not only because the cerebrospinal fluid pressure is decreased, but also because of the removal of any blood which may be present in the subarachnoid space. As mentioned above, blood produces a sterile meningitis and is frequently responsible for late sequelae.

**Hypertonic Solutions**

In 1919 Weed and McKibben demonstrated that cerebrospinal fluid pressure and brain bulk could be influenced by the intravenous injection of hypotonic and hypertonic solutions. They showed that experimentally, cerebrospinal fluid pressure could be markedly decreased by the intravenous injection of hypertonic solutions. Haden was the first to apply this principle clinically. He employed hypertonic glucose solution intravenously in the case of cerebrospinal meningitis, with good results. Cushing and Foley then demonstrated that cerebrospinal fluid pressure could be decreased by intravenous injection of hypertonic solutions. Sachs and Belcher were able to relieve a patient with a brain tumor and with increased intracranial pressure by the intravenous injection of hypertonic sodium chloride solution. Foley and Putnam, in 1920, demonstrated that the introduction of hypertonic solution into the intestinal tract would produce similar but less marked results. Sachs and Malone, working experimentally, were able to decrease the brain volume in dogs by the intravenous injection of a 30 per cent chloride solution. Within ten minutes after the administration a change was noted, and a maximum was reached in forty-five to sixty minutes. They found that the rate of injection could not exceed 1 c.c. per minute, otherwise there would be a fall in blood pressure and respiratory disturbances. Dowman recommended the intravenous use of hypertonic solutions in increased intracranial pressure and also advised the repeated administrations of magnesium sulphate by mouth. Fay, in 1923, advocated the use of magnesium sulphate by rectum and states that the effect becomes pronounced within an hour. He employs one and one-half ounces of magnesium sulphate in eight ounces of water. He believes that this is better than the administration of sodium chloride by mouth in that there is no vomiting and no distress. He also states that hypertonic chloride solution is dialyzable and an increased chloride content of the blood leads to secondary tissue retention, with a rapid return of symptoms after its administration. Magnesium sulphate, however, is nondialyzable and produces a rapid dehydration of the blood plasma by excretion of fluid into the intestinal wall. He was able to demonstrate experimentally that magnesium sulphate was about twice as efficient as a dehydrating agent in the intestine as was sodium chloride. He emphasizes the importance of restricting fluids during the dehydration therapy, but warns against "over dehydration." Howe, employing a large number of salts—namely, sodium bicarbonate, sodium sulphate, sodium chloride, calcium lactate, calcium chloride, sodium citrate, sodium tartrate, dextrose—found that dextrose was the only one of the group that was nontoxic and produced a satisfactory decrease in the cerebrospinal fluid pressure. Glucose, in a 50 per cent solution, is the best dehydrating agent which can be employed intravenously. Its action, though slightly less prompt than that of hypertonic sodium chloride solutions, is, however, more lasting. Its intravenous use is also much safer than that of the hypertonic sodium chloride solutions. From 50 to 100 c.c. of a 50 per cent glucose solution may be administered intravenously every six to eight hours, depending upon the se-

verity of the cerebral edema. Of immense value in the treatment of acute craniocerebral injury is the administration of magnesium sulphate either by rectum or by mouth. Dowman, in 1922, recommended the use of magnesium sulphate both by mouth and by rectum in cases of increased intracranial pressure. Since this time it has been used extensively by many authors, especially the rectal administration, which has the advantage that the patient is little disturbed, its effect is prompt, and there is no danger. As mentioned above, Fay has definitely shown that magnesium sulphate in the intestine is a more powerful dehydrating agent than any one of the other salts.

In contrast to the usual condition of cerebrospinal fluid hypertension, which as a rule is associated with acute craniocerebral injuries, there may occur a hypotension, as first described by Leriche in 1920. In the treatment of this condition, Leriche recommends the intravenous injection of hypotonic solution or distilled water. Henschen, Mallet-Guy, and Etienne-Martin report good results obtained from the use of hypotonic solutions in these cases. The latter authors believe that, as opposed to hypertensive disturbances, which produce symptoms of a relatively short duration, the hypotensive disturbances are causes of prolonged complications, and distressing sequelae. Persisting headaches—especially occipital,—asthenia, and a state of nervous irritability, are frequently present.

### Operative Treatment

Even though at the present time the treatment of acute craniocerebral injuries consists largely of conservatism, there are certain definite cases in which operation is indicated. Operation is imperative in those cases with scalp wounds, compound or depressed skull fractures, and localized intracranial hematomata. Cases with extradural hemorrhage or even intradural localized hematomata with focal symptoms and signs should be operated upon in order to evacuate the blood clot and also to secure hemostasis. Most authors believe that contusion of the brain should not be operated upon. However, Arraud and Albert Cremieux are of the opinion that localized ecchymosis of the cerebral cortex, surrounded by an area of edema, should be given the advantage of a decompressive operation. Bagley is emphatic in stating that operative procedures should not be performed in cases of hemorrhage unless a clot has formed. If a clot is not formed the operation will favor further bleeding. In those cases in which it is impossible to control the increased intracranial pressure by spinal tap and the intravenous use of hypertonic solutions, decompression is indicated in order to relieve the cerebral pressure. Bower believes that if, after the second aspiration of spinal fluid, there is an increase in the cerebrospinal fluid pressure of 20 mm. of mercury and no improvement has occurred, operation is indicated.

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## SARCOMA OF THE STOMACH

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Up to 1927 there had been reported in the world literature 265 cases of primary sarcoma of the stomach. Not one of these cases had been diagnosed previous to operation. Various reasons are given to account for the inability to diagnose this condition correctly. None of them sound very convincing. The final diagnosis of any growth depends upon the microscope and, as there is no characteristic clinical picture of primary sarcoma of the stomach, the best one can do is to diagnose a probable malignancy.

The following case is, perhaps, as characteristic as any reported and clearly demonstrates the impossibility of making other than a diagnosis of probable malignancy in a patient suffering from vague gastric distress over a period of several years.

Mr. X consulted me in January, 1930, regarding a "chronic bilious condition," as he termed it. His history is as follows: The patient is a single man, 52 years of age. His family history is negative and his past history is irrelevant with thhe exception of pulmonary tuberculosis diagnosed in 1916. At that time he came west for his health and made an uneventful recovery as far as his chest condition was concerned. With regard to his present difficulty he states that for "several years" he has suffered from "billious attacks." He emphatically states that he has never suffered from any pain, has never been jaundiced, has never noticed any edema of his extremities. His only complaint manifests itself in "spells of being dizzy, with lots of gas." As far as could be determined this state of affairs had been going on for at least five years.

Examination of the patient revealed a thin, anemic individual weighing 110 pounds. He states that his average weight is 125 pounds. Blood pressure was 85/60. Hemoglobin was 50 per cent. Red cells numbered 3,900,000. White cells, 3000, with normal differential count. The blood Wassermann was negative. The urine examination was negative and the stool examination was also negative. Physical findings were negative except for a few coarse rales on both sides. The heart was normal, as were all reflexes. The prostate was slightly enlarged, soft, not tender, and fluid from same revealed a normal secretion.

It was explained to the patient that he might be suffering from one or more of a variety of conditions that could produce the symptoms he complained of. The most impressive finding so far was the washed-out appearance of the patient. He almost looked cadaverous, and most certainly suggested organic trouble of a serious nature.

It was suggested to the patient, in view of the fact that he could take and retain food without much difficulty, that he go to bed for at least two weeks with the idea of building him up to the ordeal of a complete gastro-intestinal analysis. This he at once accepted as plausible and, in fact, made very considerable improvement under nourishing diet and complete rest.

A stomach analysis was negative. Total acidity was 67 and free hydrochloric 50. Lactic acid was negative and the gastric flora was normal.

The report of the x-ray examination of the chest was that of an old healed tuberculosis.

The x-ray report of the gastro-intestinal tract is as follows: The esophagus is normal. The fundus of the stomach fills out normally. There is a large filling defect through the pars media at the anterior wall of the stomach. There appears to be plenty of gastric lumen, as this area can be seen only by manipulation in the erect position. In the prone position this large irregular filling defect is shown on the anteroposterior films as it was seen fluoroscopically. The semi-lateral film shows a fairly good gastric outline with only a small incisura in the greater curvature. The remainder of the stomach appears normal. The duodenal cap is very easily filled and is entirely normal as to size and shape. The remainder of the gastro-intestinal tract is normal.

As a large part of the gastric defect was due to spasticity, the patient was given atropine and re-examined. This revealed an absence of the original glaring defect, but a constant depression on the greater curvature. There was a spot of barium about the size of a dime, on the anterior wall, which did not change on manipulation.

The diagnosis was ulcer of the stomach, and, in view of the size of the ulcer, the history of the illness and the marked cachexia, it was safe to make a probable diagnosis of malignancy.

The illustrations portray the cardinal x-ray findings. Drawing number 1 shows the large defect before atropine was given; number 2, the defect in the greater curvature after atropine; and number 3, the constant spot of barium in the crater of the ulcer.

Fortunately, the patient was not a neurotic type. The diagnosis was gone into in considerable detail. In view of the fact that

he had never suffered any acute gastric distress, he could not fully appreciate my anxiety and also eagerness to have him undergo surgical intervention. He at last decided to go to one of the larger medical centers in the east for a check-up. From his doctor I received the following information:

Figure 1

Figure 2

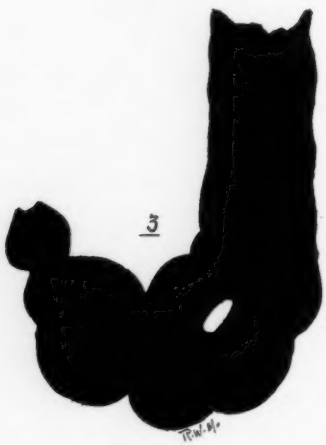


Figure 3

After a careful examination they diagnosed ulcer of the stomach with possible malignant change. At operation there was found on the anterior wall of the stomach, near the greater curvature, a tumor the size of a large plum. This was removed and followed by a typical Polya's operation. The liver, gallbladder and pancreas were all normal. The report from the pathologist is as follows:

**Gross examination**. The specimen consists of the pyloric portion of the stomach, measuring 9 cm. along the lesser curvature and 1.7 cm. along the greater curvature. There is a rather firm protuberance along the anterior wall of the greater curvature, beginning 8 cm. from the pylorus, measuring 4.5 cm. across the base and extending out for 2.5 cm. from the outer surface of the stomach. There are omental adhesions over a good portion of this mass and extending up over the anterior wall of the stomach to the lesser curvature. The mucosa is smooth and free from change except for a sharply punched-out opening which communicates with the hollowed-out interior of the mass described externally. This interior surface is ulcerated, rough and irregular, covered by fibrin. The wall is firm, pinkish-white in color, with numerous hemorrhagic areas.

**Microscopic examination**: Sections cut from the localized outpunching of the stomach wall show ulceration with entire loss of mucosa, the ulcer base being covered with fibrin, beneath which is granulation tissue mingled with tumor cells. Tumor cells comprise a mass making up almost the entire thickness of the wall, with infiltration and destruction of the mucosa, submucosa and muscularis. The cells are arranged closely together with a small amount of fine reticulum. They are of various sizes and shapes, mostly rounded or cuboidal form.

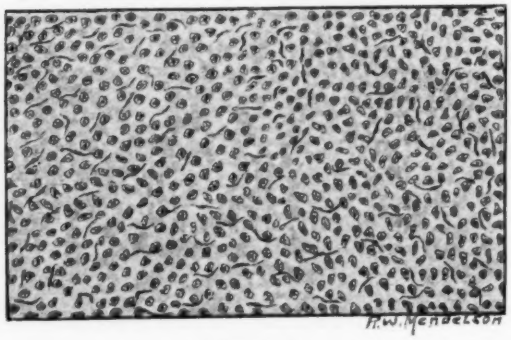

Figure 4

The nuclei are large, tend to hyperchromatism and are of loose reticulated structure. Mitotic figures are not seen. Many blood spaces are found filled with tumor cells.

**Diagnosis:** Mixed cell sarcoma of the stomach.

Condition of patient January 2, 1930: The patient is now back at work. His appetite is good, bowels normal. His weight is 116½ pounds and his hemoglobin 75 per cent. His gastric analysis shows a total acidity of 10 and no free HCl. This is as it should be considering the nature of the surgical procedure. There is no blood and no lactic acid present. He has suffered no "bilious attacks" since his operation. His medication is limited to hydrochloric acid after meals.

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## THE CAUTERIZATION OF ADHESIONS BY CLOSED PNEUMOLYSIS AFTER THE JACOBAEUS-UNVERRICHT METHOD

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and
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(Read before the Annual Meeting of the Medical and Surgical Association of the Southwest, held in El Paso, Texas, Nov. 6-8, 1930).

The end results in artificial pneumothorax are in direct proportion to the degree of collapse obtained. For years we attempted to close cavities in partially collapsed lungs by increasing the intrapleural pressure, in hope of stretching adhesions and thus obliterating the cavity. This seldom proved successful and many times proved disastrous by tearing adhesions, thus producing a natural pneumothorax and a resulting empyema.

For the purpose of argument, let us review a few facts relative to advanced tuberculosis. A number of years ago the United States Public Health Service made a survey of the tuberculosis situation in the Southwest. They found that 47 per cent of patients coming here died within six months of arrival. The statistics of one of the best institutions in the west shows that 80 per cent of their patients are dead within three years of discharge. The report of Harry Lee Barnes, of the Rhode Island State Sanatorium, shows that 85 per cent of cavity cases are dead within fifteen months of the time the cavity was diagnosed.

These figures are appalling, and no doubt exists in our minds that no small number of the 47 per cent dead in the Southwest six months after arrival, of the 80 per cent discharged sanatorium cases, and of the 85 per cent dead cavity cases of Barnes, could have been saved had proper advice and treatment been instituted before it became too late.

Two reasons for this situation stare us in the face: (1) Lack of early diagnosis; and (2) delay in instituting collapse therapy in cases of suitable type.

Eearly tuberculosis gets well in the majority of cases, and, if the patient is given the benefit of such diagnosis, he usually is not a candidate for collapse treatment. The average sanatorium head is today still keeping patients on bed rest in a vain endeavor to clear up advanced disease, when many such patients could be restored to a

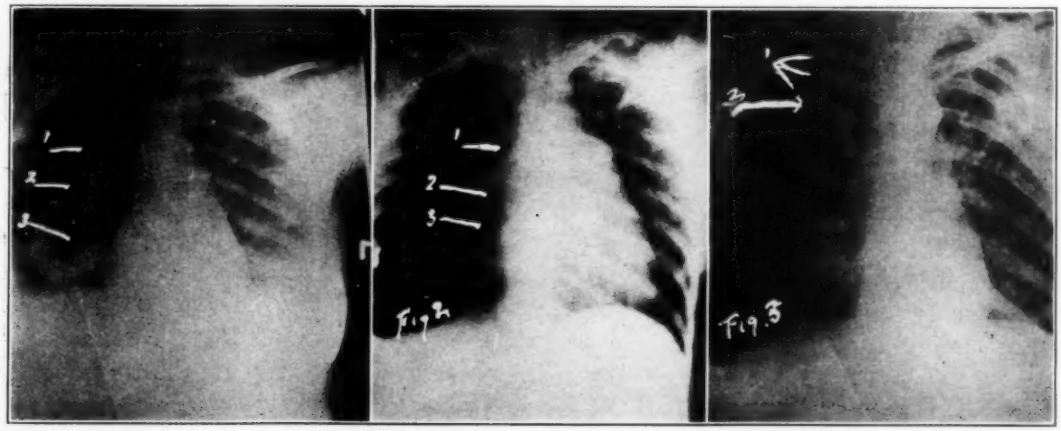


Fig. 1. Showing thick-walled cavities at 1-2-3. Multiple adhesions with one broad band. This is the patient in whom a shift of mediastinum occurred after burning broad band.

Fig. 2. Same as Fig. 1 with all adhesions burned. Walls too thick to get complete closure of cavities.

Fig. 3. Three a hesions at 1. Cavity 2.

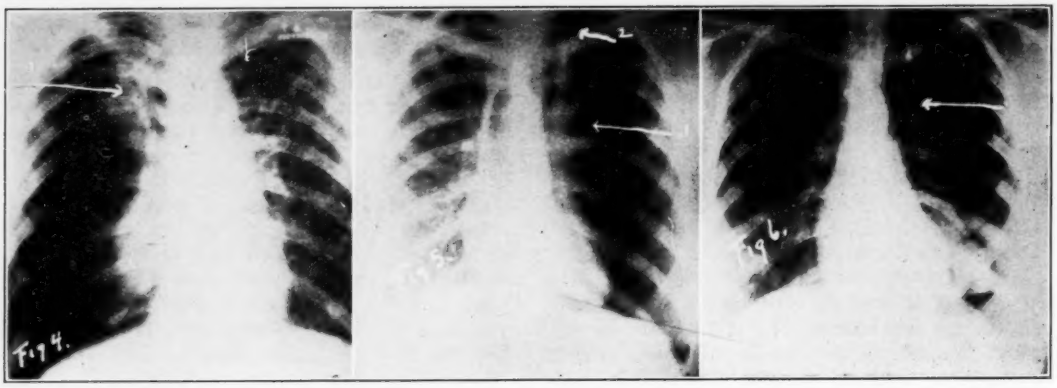


Fig. 4.—Cavity closed after three adhesions burned.

Fig. 5.—Adhesions at 2. Cavity 1.

Fig. 6. Same as Figure 5, cavity closed.

life of economic usefulness by the modern methods of so-called surgical compression.

In our original study of 700 cases of artificial pneumothorax, we found that 39 per cent showed a complete collapse, and 33 per cent partial collapse. In the complete collapse cases, 53 per cent are well and 24 per cent dead; in the partial collapse cases, 25 per cent are well and 44 per cent dead. It is very apparent that complete collapse is the sine qua non to success.

Until two years ago we made the best of a bad situation, but since that time we have been burning suitable adhesions after the Jacobaeus-Unverricht method of closed pneumolysis. This we feel to be a much saner and safer method than the open one.

Many operators still believe in carrying high pressures over long periods of time, expecting thereby to close cavities and effect a compression of the diseased area. This, as we have said, is dangerous and a waste of valuable time. After a pneumothorax has been carried on for a three-months period with only a partial collapse, x-rays should be taken and adhesions studied with the view of cauterization. Even when the x-ray leads one to believe that little can be done, exploring the pneumothorax cavity by the introduction of the thoracoscope often leads one to a very gratifying result. If watchful waiting is the keynote, adhesions will become organized, collateral circulation established, and failure will result.

Cauterization is indicated: (1) in all cases where, after three months' treatment, only a partial collapse is obtained; (2) in all cases requiring high positive pressures to maintain collapse, even when the collapse is complete; (3) in all cases where organized adhesions tend to contract and pull out the lung, thus obliterating the pleural space and making the continuation of the pneumothorax an improbability.

Cauterization is contra indicated: (1) when the contralateral lung is a poor risk, and the disease in that side is retrogressive; (2)

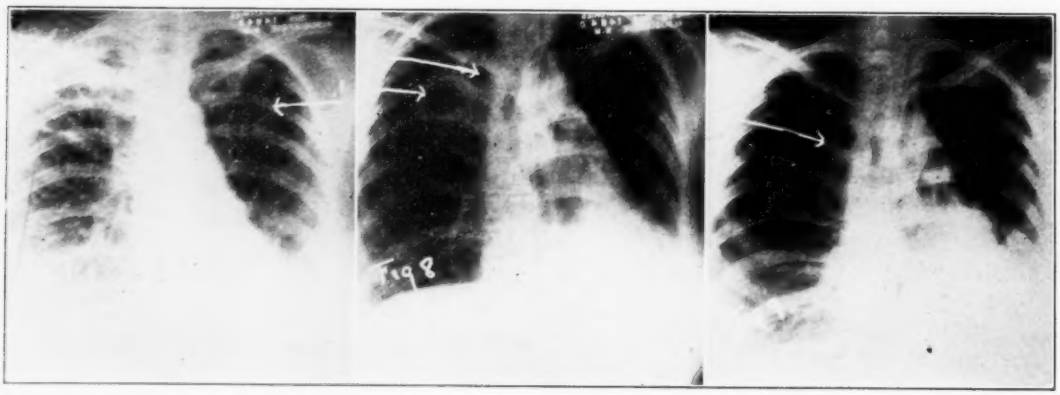


Fig. 7. Pneumothorax on left for two years. 1 is edge of re-expanding lung. Right cut large cavity following influenza. Pneumothorax instituted on right to close cavity at 2.
Fig. 8. Same as Figure 1 after pneumothorax. 1 adhesion; 2 cavity.
Fig. 9. Same as Figure 8 after cauterization.

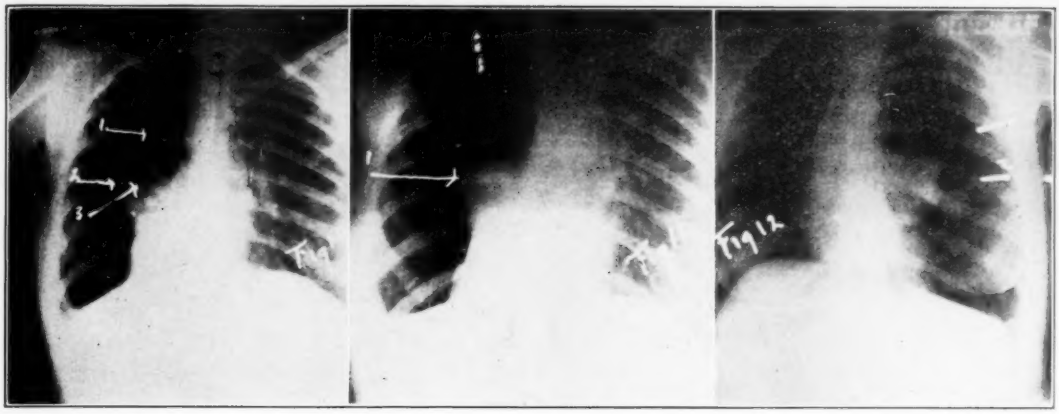

Fig. 10.—Adhesion 1. Edge of lung 2. Cavity 3.

Fig. 11.—Same as Figure 10, showing closure of cavity.

Fig. 12.—String adhesions 1. Band adhesion 2.

when there are other complications which in themselves may prove fatal.

The operation is a simple one and the patient usually experiences little discomfort. Sometimes it is necessary, where multiple adhesions exist, to do the burning in several stages. Postoperative treatment requires rest in bed for four to ten days, with sedatives to control cough. Pneumothorax refills can be resumed usually in forty-eight hours after the operation, with small amounts of air under low pressure.

The complications in our series have been insignificant. Bleeding was encountered in a few, but was so slight as to be easily controlled by the cautery.

Fluid developed in thirteen cases, or 36 per cent. This is handled as in the usual run of pneumothorax cases. One empyema developed, and this in the first patient on whom we operated. It was due to the fact that what we thought to be a band adhesion proved to be the floor of a cavity. The cauterization was interrupted when the mistake was noted, but in a week's time a tear occurred. The same patient is alive and well today after a thoracoplasty. A shift of the mediastinum occurred in one patient after burning adhesions that were under high tension. Dyspnea and cyanosis were marked for forty-eight hours, but the picture cleared with no untoward results.

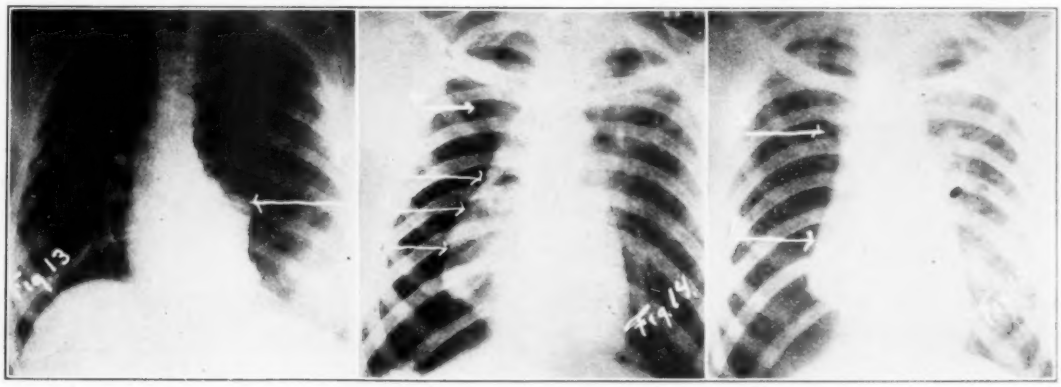

Fig. 13.—Same as Figure 12 showing closure of cavity.

Fig. 14.—Cavities at 1-2-3. String adhesion at 4.

Fig. 15.—Same as Figure 14 with all cavities closed 2 shows stump of adhesion.

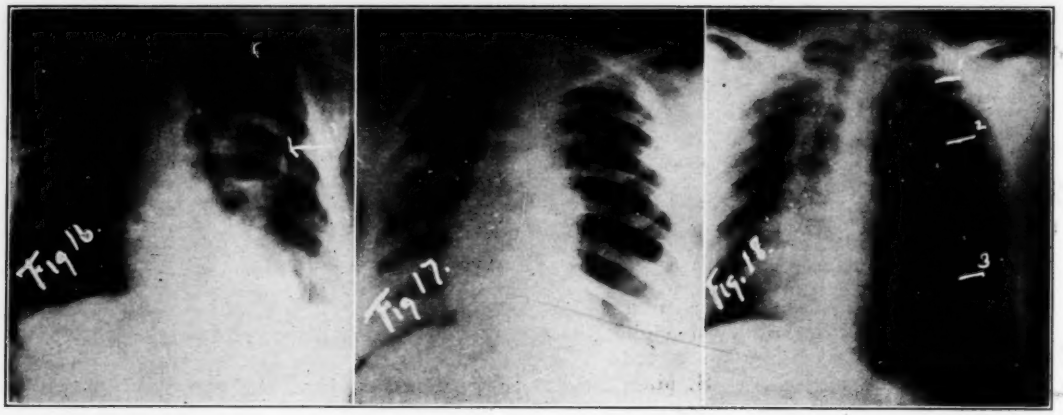


Fig. 16. Large cavity at 1.
Fig. 17. Same as Figure 16 with cavity closed. Note that edge of lung cannot be seen.
Fig. 18. Multiple adhesions at 1 and 3. Cavity 2. Mediastinal shift.

During the two years' time, we have attempted pneumothorax on 149 cases. In this number, sixty-six, or 44 per cent, gave a complete collapse; fifty-five, or 37 per cent, a partial collapse; and twenty-eight, or 19 per cent, showed no free space. Of the partial collapse cases, a cauterization was done on forty, or 72 per cent. Four could not be burned on exploration, leaving thirty-six to be studied. Of these, twenty-seven, or 75 per cent, were given a complete collapse. Six were benfited, but not all adhesions could be burned. Two received no benefit, and one, as stated, had a natural pneumothorax with empyema.

To have converted 75 per cent partial to complete collapse cases, seems to us to speak in no uncertain terms for a more general use of the method among pneumothorax workers.

A detailed discussion of the surgical technic can be read in an article we published in the Medical Journal and Record for September 17, 1930, reprints of which will be sent on request.

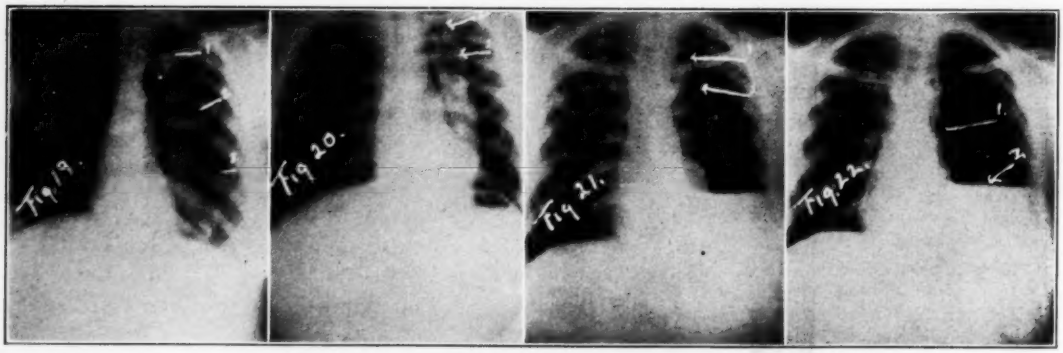


Fig. 19. After first cauterization. Still held at 1 and 3.
Fig. 20. After 2nd operation. Still holds at 2 and cavity showing at 1.
Fig. 21. After 3rd operation. Adhesions burned. Top of lung at 1. Cavity still shows at 2.
Fig. 22. Complete closure after pneumothorax refills. Note fluid formation in Figures 21 and 22.

# THE CRITERIA WHICH DETERMINE A SURGEON'S TREATMENT OF THE TOXIC GOITER PATIENT

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(Read before the Fifteenth Annual Meeting of the Medical and Surgical Association of the Southwest, at El Paso, Texas, Nov. 6-8, 1930).

It is the recognition of contraindications, one after another, to operation upon highly toxic patients that has, little by little, decreased the surgical mortality to a figure that would be considered almost negligible in any field. What this means for us today was conveyed in a remark of C. H. Mayo, some years since, that his first series of thyroidectomies, where toxicity was high, done near the beginning of this century, entailed a mortality of 25 per cent; this from a highly gifted operator. Think what it must have been in other hands at that same time.

The subject of this paper suggested itself after we had recently made an analysis of our last 100 deaths in hospital from all causes. There were thirty-seven cases of thyrotoxicosis among them. Of these, fourteen, or 38 per cent, died before operation. This is a fairly good expression of the extreme gravity of the situation in which many of our cases find themselves. I wonder whether so even a ratio exists between non-operative and operative deaths in any other disease amenable to surgery. Certainly not in our experience. It is partly the expression of the notorious inability of the thyrotoxic patient to appreciate the fact of his sickness and partly due to the confirmed habit of the general practitioner of treating thyrotoxicosis indefinitely as though it were a medical disease. Of those patients dying before operation from whom a history could be obtained, there had been a recognized goiter for from eight to thirty years in 80 per cent. Definite symptoms of toxicity had been present for over one year in 65 per cent of this group. Of the patients dying following operation, death occurred in crisis, in afebrile circulatory failure and from complications, in about equal numbers. All of those dying in thyrotoxic crisis had been toxic for over ten months, with one exception, and were, with one exception, under fifty years of age. Those dying in afebrile circulatory failure were, with one exception, over fifty and had had their goiters for periods ranging from ten to twenty-six years; only one, however, had had toxic symptoms for more than six months. The circulatory systems of persons past middle life obviously stand the added imposition of thyrotoxicosis poorly.

Three classes, roughly speaking, may be said to suggest themselves for patients who come to a goiter clinic. (1) At one extreme are the ordinary surgical risks, in fair health as measured by every standard and ready for more or less immediate operation. (2) The intermediate group for whom the modern detailed scheme of preparation is proposed is large; they are the doubtful class, not surgical patients now, but having definite possibilities of surgical cure within a reasonable period. (3) At the other extreme is a group most members of which should be rejected, or accepted with every reservation and no prognosis or promise of any sort made; here we find congestive heart failure, serious parenchymatous changes, extreme emaciation, marked nervous and mental imbalance, and so forth. This worst type of toxic goiter patient should be admitted to the hospital with the full understanding that nothing radical can safely be attempted for several months, that is, probably not during the primary stay. Reparative processes are time-consuming; no thoughtful physician would recommend major surgery, unless of emergency nature—which thyroidectomy never is Hertzler)—until long after an attack of typhoid fever or pneumonia. Is it then, during the acute phase of this disease, which makes no less early serious inroads, logical or sensible to impose a dangerously heavy load until the maximum of recovery has been reached? An operation while a patient is too toxic is the more inexcusable, particularly in view of the experience that the disease is usually characterized by more or less complete remissions of some months, during which periods a thyroidectomy is relatively free from danger. It will be remembered in this connection that fifty patients were treated at Mt. Sinai, some years ago, by merely resting and feeding them, the results for the time being uniformly good; all of which has a quite obvious bearing upon the period indicated for radical operation.

There is no such thing as surgical treatment for the relief of a toxic patient on the down-grade. This dictum has long been generally accepted, as far as thyroidectomy is concerned, but I am sure that the various steps of the graded operation should be included as well. As a proof of this statement, I submit the current belief that ligation carries a much higher mortality than thyroidectomy, explained by its being done in the worst type of patient, that is, when nothing at all operative was justifed. To go further, I have seen death produced by a hot water injection. All of this in patients

who may reasonably expect a free interval, if only they wait long enough.

The medical adviser is prone to feel at times that the patient is at a standstill and to offer as an argument for operation the statement that "she will improve no further unless something is done." Such reasoning should, of course, carry no weight unless the patient be well within safe limits, though we have too often heard it used as an alibi following an operative tragedy. To make the matter worse, it must be admitted that no one knows when the toxic goiter patient may make an unexpected amount of spontaneous temporary improvement.

## NEED OF ROUTINE CRITERIA

The mortality following thyroidectomy upon toxic patients is probably so great, if all operators are considered, as to warrant the contemplation and employment of some sort of routine memory check-chart of the sort proposed. The nearly 100 per cent results in the best-known goiter clinics seem to have been achieved by a proper choice of patients for operation. Surely they have not been a result of improvement in operative procedure alone; the principles that governed Kocher in his earliest days have not yet been discarded. It is difficult to discover from their writings just the process of elimination practiced by conspicuously successful goiter surgeons when dealing with types of patients unsuited to operation, hence, I have taken pains at this time to crystallize the clinical and, to a lesser extent, the laboratory data which seem to represent the minimum requirements to be met by any patient who is definitely safe as a risk for thyroidectomy.

The special criteria by which we judge a thyroidectomy to be safe for the individual toxic patient do not, probably, differ in any essential from those accepted by other surgeons of wide experience in this field; the order of their seeming importance will, I am sure, vary in the different clinics, according to the experience of each, which is as might be expected. Visits to the various clinics of note reveal the fact that widely separated sections of the United States present patients of diverse types and of quite different degrees of severity. It is better to have any graphic check that is followed systematically in every instance than to have none. In this way alone it is impossible to overlook one or more of the vital data, all of which must be satisfactory if a calamity is to be surely avoided. When working without some such routine plan, it is an easy matter to gain a sense of false security from a surprising improvement in pulse rate or general appearance when other vital data which would suggest further postponement of operation remain unnoticed and the unexpected happens.

No check form is needed for most pathological conditions since one generally accepted contraindication settles the matter of delay for maximum improvement. No well-informed surgeon chooses for radical operation the acutely jaundiced gallstone patient, the pyloric ulcer patient who has just experienced a profuse hemorrhage, or a sufferer from acute prostatic retention. Another picture is presented by toxic goiter; here any one of half a dozen different considerations may vitally affect the end result, hence, the value of a memory check.

Almost every one of our goiter tragedies in recent years (excepting, of course, an occasional operating-room accident or postoperative complication) seems easily explainable when scrutinized in detail according to the outline of our present indication chart. Practically every such patient was definitely substandard in one or more particulars which seemed inconsequential in view of satisfactory gain in certain directions. Hence the value of some memory check which leaves little chance of failure through an operator being misled by what may be termed "general impressions" of a patient. These criteria which we employ and suggest for the routine estimation of toxic goiter patients are: (1) heredity, (2) age, (3) duration, (4) circulation, (5) excretion, (6) nutrition, (7) self-control, (8) metabolism, (9) "breathing time."

HEREDITY. Our clinical and laboratory examinations by which we estimate a patient's condition, are manifold. They give us a certain picture of more or less damage to heart, kidneys or whatnot, as the case may be. We are too prone to have our attention fastened on inverted T waves or hyaline casts, forgetting that any two patients exhibiting such findings may have entirely different futures. Beyond all clinical data that can be assembled, lies that quality of "vitality" or "reserve" which is handed down from forebears who for generations have been long-lived or short-lived, as the case may be. Some breeds are "hard to kill" and live up to that reputation in withstanding illness or operation; others, apparently quite as sound so far as we can measure, show a disconcerting tendency to die young, as a matter of family tradition, once a severe strain of any sort is put upon them. Let us not narrow our vision of a patient to such an extent that these intangibles are excluded.

AGE. The very young (under 18) and the elderly (over 50) are regarded as relatively poor risks on the basis of age alone, but for different reasons; the young for fear of recurrence, and the elderly for fear of primary mortality. The situation of a child or an adolescent who is truly thyrotoxic is tragic in its implications. One does not like to take too much of the gland at operation because of the physiologic needs of the developing body and mind; one dares not leave much because of this same demand that will be made on the remnant by the metabolism, with risk of recurrence. The resistance to stress is less during the periods of change, particularly of growth, as truly in the human as in unicellular organisms. Bearing this in mind, one must supervise the minutiae of every-day life in these youngsters, following operation, until maturity is reached, if one have any hope of as satisfactory results as in adults, who are relatively in a "resting stage." Faced with a definite recurrence, it is imperative that reoperation be performed, since recovery otherwise is hopeless in the face of the physical and emotional readjustment to life that is the whole basis of adolescent physiology. The situation, we have said, is potentially tragic. It is not unlike that of the diabetic child.

We have spoken, elsewhere in this paper, of our experience on thyrotoxicosis in those past the prime. Even if the disease is of short duration, elderly people cannot be long confined to bed without serious impairment of vitality; they do not stand any operation as well as they would have twenty years previously. Consequently, we do as little at a time to them as is consistent with a reasonably speedy recovery.

DURATION. Long duration makes the vicious circle of thyrotoxicosis more difficult to break and it makes the breaking of it unquestionably more risky in that the degenerative processes of age, if the patient is elderly, underlie the damage of thyrotoxicosis. The onset of toxic symptoms in a goiter that has been present for many years, is characteristically insidious. We regard as typical the patient who first admits having been nervous for only a few months and later recalls dyspnea on mild exertion with transient palpitation for ten years. Even in the absence of decompensation, we get discouraging electrocardiograms from them and occasional patients of this group are apt to die with afebrile circulatory collapse if approached incautiously. In judging the status of middle-aged patients, we pay little attention to a history of only short duration of recognized thyroid enlargement. The finding of calcium deposits in goiters whose presence was known for only a few months, makes such histories of only academic interest. But if the history be carefully taken, duration of symptoms of toxicity is an important point as a guide to estimating what preparatory treatment is to be expected, what the operative risk is likely to be, and how long disability subsequent to operation will continue.

CIRCULATION. In considering the condition of the patient's heart and circulation in regard to choosing the time of operation, we must remember that every goiter patient with hyperthyroidism has an increased pulse rate and an overactive heart directly proportional to the degree of hyperthyroidsm. In the majority of instances, the heart itself is normal, and its overactivity represents the response of the normal heart to the stimulus of hyperthyroidism. Other factors being favorable, we need have no fear that the patient will die of heart failure. The operative deaths are most often due to acute thyrotoxicosis, and, because of the fact that in this state the patient's heart rate becomes extremely rapid, we must not allow ourselves to evade the responsibility of a thyrotoxic death by ascribing the death to heart failure.

There is one cardiac condition, however, which is an absolute contraindication to operation, namely, congestive heart failure. It is not unusual for a goiter patient to go along for years with a relatively mild and often unsuspected hyperthyroidism, and gradually to develop cardiac decompensation. At times the decompensation may come on abruptly, due either to a cycle of increased activity of the goiter or some unusual overactivity of the patient. At any rate, we find the patient with edema, which may be so extensive as to include effusions of fluid into the pleural and peritoneal spaces, enlargement of the liver and congestion of the lungs. Any degree of cardiac decompensation of this sort necessitates postponement of any operation until cardiac compensation has been restored by prolonged medical treatment.

Auricular fibrillation is so common among goiter patients that internists have come to suspect hyperthyroidism in every patient with either transient or continuous auricular fibrillation. The irregularity of the heart is not in itself a contraindication to operation. If there is no congestive heart failure, the irregularity per se may be disregarded. During the period of preoperative treatment, as the hyperthyroidism decreases the heart action often spontaneously becomes regular. It is often advantageous to

give these patients small doses of quindine, which is particularly effective, and is also apparently particularly harmless in goiter patients. It is important that unless there is definite cardiac decompensation, digitalis should not be used. Digatalis seems to do more harm than good, and we have long ago ceased using it as a routine preoperative treatment. In the cases with congestive heart failure, however, the exact opposite is true, and large doses of digitalis are extremely valuable.

The systolic blood pressure is, of course, usually elevated in hyperthyroidism, with a decreased diastolic pressure giving a wide pulse pressure. A useful point in evaluating the circulatory condition is the presence and degree of shading of the diastolic pressure. A large amount of shading is indicative of poor and unstable vascular tone, and is an unfavorable finding.

The pulse rate usually parallels the basal metabolism, and a constantly very rapid rate is, of course, unfavorable. At times we find that the sleeping or resting pulse is relatively slow, whereas the slight flurry of excitement caused by the physician's visit results in a marked increase of pulse rate. This is more indicative of emotional instability than of cardiac weakness, but is, nevertheless, an unfavorable point.

EXCRETION. The excretory systems are of importance to our estimation of the patient in two connections. (1) Renal damage of clinical significance is rare in thyrotoxicosis per se, except as a terminal event. The kidney function of elderly patients, particularly of those who have an associated hypertensive cardiovascular-renal syndrome, must be carefully determined by urinalysis, ability to concentrate, ability to excrete dye, such as phenolsulphonphthalein, and retention of nitrogen in the blood. Nitrogen retention of high degree is an absolute contraindication to operation; even mild retention should be demonstrated to be stable and not rising, by repeated examinations, before operation is considered. Persistent nitrogen retention, except that due to dehydration or cardiac decompensation that can be relieved, indicates a future so gloomy because of renal disease that thyroidectomy would not be likely to increase expectancy, and would, therefore, be unjustified. In the absence of nitrogen retention, inability to concentrate the urine higher than, say, 1012, makes us careful to throw as little operative burden as possible on the cardio-renal apparatus that goes with it; in such a case we tend to divide the operation into stages. It so happens that we are rarely faced with edema of "renal" origin. It constitutes, of course, a complete contraindication to surgery, not only until it disappears, but for a sufficient length of time thereafter so that satisfactory renal function can be reestablished and maintained. Active urinary tract infection must be brought under control to the extent that the patient is free of urinary symptoms before operation is contemplated. We routinely do P.S.P. determinations on patients past middle life, regarding a total dye excretion of about 70 per cent in two hours after intramuscular injection as satisfactory. Further investigations are made as routine urinalysis or symptoms warrant. (2) Generalized glandular overactivity is, of course, characteristic of acute thyrotoxicosis. We do not regard the patient who is sweating profusely or is having diarrhea as ready for even the shortest operative procedure. The onset of bronchorrhea is a sign of impending dissolution. Patients dying in acute thyroid crisis seem almost to drown in their own bronchial secretions. We rarely have occasion to investigate liver function in determining operative risk in goiter. Damage to all parenchymatous organs is described as occurring in crisis. Except in connection with coexisting biliary or hepatic disease, the estimation of the function of the liver, whose reserve is second only, perhaps, to that of the myocardium, concerns us little.

NUTRITION. The nutritional state on entrance affords us a means of estimating roughly how extensive an operation the patient will be able to stand. The emaciated, severely depleted subject can rarely be put in shape for more than ligations; the patient who has lost, say, not over 10 per cent of his body weight can usually be prepared for subtotal thyroidectomy. In the intermediate group, it is important to know whether the patient is regaining lost weight or is still losing at the time of entrance to the hospital. This indicates whether or not the patient is going toward or away from a natural remission. Changes in weight on bed-rest and treatment are not so important. In our experience almost all goiter patients lose weight during their hospital stay, for preparatory treatment does not induce complete, but only partial, remission. Though we have not investigated the point particularly, it seems likely that only patients who are gaining weight previous to entrance will continue to do so in the hospital. The rate of loss, however, must decrease on treatment, for continuing rapid loss of weight is an absolute contraindication to surgery.

SELF-CONTROL. This is a factor which defies definition; our evaluation of it is,

therefore, vague. The stimulation of marked thyrotoxicosis is unmistakable. When put to bed, patients cannot at first relax. The earliest sign of benefit from preoperative treatment is the disappearance of restlessness, constant change of position, unpremeditated motions of the hands and feet. The speech of such patients begins to slow down. Their thoughts, apparently, become more reasonable and they show a disposition to recognize the situation and cooperate in getting themselves ready for operation. We distrust as an operative risk the patient who cannot relax, who continues to talk about the necessity for hurrying the day of operation, who talks from day to day of getting up and going home. We rarely have to worry about the patient who will let us do the worrying. Finally, the patient who, after the usual preoperative sedatives, comes to the operative table in an unmanageable condition, is promptly sent back to bed. It was long ago learned that this patient cannot be properly anesthetized and that to proceed with operation at that time invites almost certain disaster. Such a patient should be ligated eventually and sent home for a few months.

METABOLISM. The metabolic rate, as a guide to how much operating may be done at once, is, we often think, really the least useful of the criteria by which we judge the risk. We find ourselves doing subtotal thyroidectomy on a patient whose B.M.R. was plus 55 on the preceding day, with little subsequent reaction, then doing ligations on another patient whose rate is even lower. A series of metabolism determinations throws light on the course of the toxicity, but adds to the patient's expense. Our routine is to do the determination only at entrance as part of our estimation of the patient's original status toward which we can expect a reversion immediately following operation. The metabolic rate is distinctly useful to us, of course, in differentiation of cases of anxiety states and mild hyperthyroidism and in the treatment of hypothyroidism.

"BREATHING TIME." The final criterion for operability to which we turn, is the ability of the patient to hold his breath. The duration of voluntary apnea after both deep inspiration and deep expiration and the ratio between them, determines what we refer to as the "breathing time;" this is expressed as a fraction in which the numerator represents the duration in seconds of voluntary apnea after deep inspiration, the denominator giving the corresponding value after deep expiration. The normal ratio between the two figures is approximately two to one, the duration in seconds varying normally with age, sex, and athletic training especially. This observation was made at five intervals during the preoperative care of a series of cases and a correlation found to exist between the "breathing time" and the other phenomena whereby we estimate the progress in thyrotoxicosis. A preliminary report of the findings was made by the junior author before the American Association for the Study of Goiter at this year's meeting. Briefly, our study to date indicates that the breathing time, expressed, as stated, in the form of a fraction, varies characteristically with the progress of the disease; its two factors show a differential response to particular phases in the patient's disease. Changes in the numerator closely parallel changes in pulse rate and blood pressure and the numerator, therefore, seems to be an expression primarily of the condition of the cardio-vascular system, including, probably, the alkali reserve; the denominator, on the contrary, varies directly with the general level of metabolism. One must bear this differential response of the factors in mind in interpreting one's findings, also the fact that as improvement occurs the ratio approaches the normal, 2:1, whether the first ratio determined be 1:1 or 4:1. The characteristic ratio is 1:1 in acute, untreated hyperthyroidism in persons other than trained athletes or those doing much manual labor. We know so little yet of the exact physiological explanation of these observations that we offer our present working rules in interpreting them as only tentative. Moreover, one must be able to estimate roughly what the duration of voluntary apnea in health for the individual patient must have been; this comes only after experience with the test on many toxic and non-toxic patients. When the anticipated limit of improvement on preparatory treatment has been reached, it is our tendency to work cautiously, that is, to do ligations or lobectomy, if the ratio be not yet nearly 2:1, but if it is approximately 2:1, we are more apt to do subtotal operation. On the consideration of concrete cases we can be much more definite than this, but it is equally impossible to generalize on the application of any other clinical test.

Since the "breathing time" gives us the information combined in pulse rate, blood pressure, and metabolic rate, we find it invaluable and place more reliance on it, certainly, than on any one of them.

Before passing on from a consideration of these nine criteria, we must urge that it seems to us wholly logical to establish surgical indications when the patient is first seen if all operative risk is to be avoided;

especially is this true of an elderly individual and of one who has been long sick. A rapid apparent improvement during artificial existence in hospital, may deceive one as to real conditions, hence it should not be the only criterion. Here is an example. Miss F., 53 years old, died July 13, 1930, some fifteen hours after operation, of acute heart exhaustion, having apparently borne thyroidectomy perfectly after satisfactory preparation of three weeks; she had seemed a complete wreck when she entered the hospital with a history of twenty-five years of semi-invalidism.

TECHNICAL CONSIDERATIONS

It should always be borne in mind in every type of thyroid operation, that practically no dependence is to be placed on the positive appearance of good condition on the operative table. The surgeon who considers this one of his reliable criteria and aims to go as far as the doubtful patient's condition permits, is sure to lose some patients within twenty-four hours, from circulatory failure, thyrotoxicosis, or respiratory failure. The explanation is that the resulting breakdown first comes entirely without warning several hours after too much operating on a patient whose maximum limit of toleration should have been established preoperatively. On the other hand, there is great value of a negative sort to the warning that a patient is failing on the table. When this appears, pack gauze about clamps and cease at any stage.

The graded operation is much more common in our own experience than one would expect it to be after learning from Pemberton that it is most unusual at the Mayo Clinic. The contrast is more apparent than real, explained, I think, by the fact that we work in a large city while much of their work comes from very distant localities. Consider that the neglected patient, if any, requires the graded operation, that he is not likely to be well informed on distant clinics, that he may not be well enough to endure a long journey, and that he is likely to remain at home for lack of funds; then one may have a partial explanation, at least, of this problem.

We have published elsewhere (monograph), in considerable detail and with numerous illustrations, the technic of various thyroid operations as employed in our service. No more than passing reference will be made to the matter here, though it must come to mind in this connection, because some of the patients who urgently need surgery are wholly unsuited to the demands made by the complete bilateral resection (the ideal operation). In all instances the type of operation must be chosen to meet individual requirements.

The surgeon's aim and endeavor will be, of course, the bilateral subtotal resection of the gland; in other words, one operation, one hospital stay—a procedure which is compatible with safety in most instances. There are, however, a number of patients who require an unreasonably long period of preparation before the ideal operation can safely be carried out; just here the multiple-stage procedure is used in our clinic. We do more, perhaps, than economize time in some instances. We may thus broaden the field of surgery by finally getting out all desired thyroid tissue on the patient who could never have borne the ideal operation at one stage.

We find three graded procedures most useful: (1) ligation, (2) preliminary flap-cutting, (3) lobectomy through a lateral incision. (1) Ligation of the upper pole, including vessels, lymphatics and secretory nerves, is a standardized procedure which requires no discussion here. We reserve it for the patient who is improving so slowly that no radical surgery is in sight during a hospital stay of reasonable length. (2) We do "preliminary flap-cutting" one week before bilateral resection on the patient whose improvement rate indicates that removal of the whole gland will be barely possible provided there be no mishap at operation or afterward; on such a patient we can do almost half the work in advance by exposing the gland, doing all the superficial ligating, then tightly closing the wound. A week later the gland can be exposed without applying a clamp, resected, and the partial closure of dry flaps made with a far slighter drain on the patient's slender reserve than would otherwise have been the case. (3) We remove one lobe only from the individual who seems too good for ligation but who definitely does not measure up to the minimum standard we have set for bilateral resection. Approach to the single lobe is made through an oblique lateral incision which splits the sterno-mastoid longitudinally. The lobectomy is simplified and time saved on a man whose collar will cover the scar, also on a woman whose age or degree of disability renders a visible scar comparatively unimportant, in her own eyes at least.

One might expect the mortality following the removal of a second thyroid lobe during one hospital stay to be practically nil, on the theory that we prove the patient's resistance by the first successful attempt. However, we greatly deplete the patient at the first sitting, hence must be very certain

that sufficient strength has been restored before the second lobectomy, else the mortality attending the second stage may be greater than that incident to the first, illogical as they may seem on first thought. We therefore send her home for several weeks' recovery before invading the opposite side, if this be at all feasible. No time interval can be suggested to fit all cases; it must be a matter of condition with each individual and should be measured by the ability to be up while weight, strength, appetite, pulse and self-control are improving.

There are, in addition, toxic thyroid patients in whom special invalidism indications present themselves. It is, I suppose, fairly well known that a clinical diagnosis of thyroid malignancy absolutely precludes surgical treatment; not only is an operating room tragedy well within the possibilities, but it should be fully understood, in addition, that the patient thus affected has been benefited for a considerable period only after the accidental finding of a malignant area in the thyroid specimen that has been removed.

As an example of the occasional special technical considerations which arise now and then, we are insisting that a thyroidectomy for recurrence should be done in two steps. These patients are older and present greater risks than at time of original operation. Adhesions increase the risk of accidental injury to trachea, great veins, parathyroids and particularly to motor nerve supply of larynx. Unilateral abducens palsy is ordinarly well borne, but a double lesion is often fatal. If second lobectomy causes it after palsy has subsided on the first side, no great harm is done.

Our criteria of operability multiply when we are frequently faced with two or more surgical lesions of which one is goiter. In what order shall they be dealt with? Thyroidectomy should be done first (a) if the patient is highly thyrotoxic, (b) if inhalation anesthesia will be required for the other operation, (c) if the goiter is the lesion that seems overwhelmingly the more important to the patient. One should not risk the stress of an abdominal hysterectomy for relatively asymptomatic fibroids in a thyrotoxic patient who has lost a third of her body weight, until after thyroidectomy has been done and the patient has had a year to regain her weight, strength, and cardiotially substernal goiter, in which unsightlivascular stability. In the case of large parness or pressure symptoms greatly annoy the patient, thyroidectomy should precede, say, hemorrhoidectomy or perineorrhaphy.

The operation other than thyroidectomy should be done first (a) if for a malignant lesion, (b) to eradicate a source of infection (other than in the tonsils), (c) if it entails the longer hospital stay. But treatment and rest sufficient to bring the thyrotoxicosis within control must be instituted before any operation is done. Thus, at the time of writing, we have a 62-year-old woman in the hospital who entered with a carcinoma of the breast, a toxic goiter of which she was unaware, (B.M.R. puls 41), and chronic nephritis of moderate degree. She was put on preparatory treatment for a week, then simple amputation of the breast was done, since x-ray of the chest disclosed pleural exudate, presumably from metastasis. Her expectancy is so short that her thyrotoxicosis can be fairly well controlled by partial limitation of activity with occasional complete bed rest, x-ray and iodine. Had she not had evidence of metastasis, we should have done radical amputation and thyroidectomy later. If a patient has a non-toxic of mildly toxic goiter, he will be confined to bed only a few days after thyroidectomy. If, in addition, he needs cholecystectomy, which will keep him in bed for ten days to two weeks, we do cholecystectomy first and do the thyroidectomy eight or nine days later, so that the total disability is still only two weeks, whereas it would be nearer three weeks if thyroidectomy were done first. We sentence the patient to bed on two counts, so to speak, but make the sentences run concurrently.

## SUMMARY

The charm which uncertainty holds for the born gambler can well be understood by the surgeon who at times finds it difficult but alluring to determine the weight of evidence for or against operation on a patient who has been extremely toxic. Success or failure in this field is largely a matter of contraindications and utterly impossible unless they be recognized. There are, of course, other important phases of this work: the diagnosis, but it is not difficult in the severe case; the preparation, which has been greatly facilitated by Plummer's advocacy of Lugol's solution; the operation, a mere matter of technical ability, organization and experience; the aftercare, which dwindles in importance provided the patient has been correctly chosen and the operation well conducted. But the keystone of this arch is the "contraindications." They are established by deductive reasoning of the highest type and it is hoped that a study of all patients according to the routine we are proposing may go far toward taking the element of uncertainty out of our results.

We may well add, in closing, that the mor-

tality during a period of financial stringency (1930) is sure to be higher than in normal business years. Not only does the pinch of poverty added to the other stresses of the disease render the toxic patient a poorer risk, but the moderately sick indicidual who can for a time postpone surgical treatment, does so to the point of complete incapacity; as a result we now see relatively few of the patients who usually enable us to keep down the low mortality possible in this sort of surgery.

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## CESARIAN SECTION IN THE GOOD SAMARITAN HOSPITAL DURING 1930

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Phoenix, Ariz..

(Analytical report made by Obstetrical Committee, at Staff Meeting of Good Samaritan Hospital, Phoenix, Ariz., for December, 1930).

### ABSTRACT OF CASES

Case 1. (9579) Age 29, para II: first labor at age of 20; hard labor but normal delivery. Physical findings normal, blood pressure 124/90, entered hospital for cesarian section. Past term, membranes not ruptured. Kept in hospital one day for observation. Cesarian section performed. Mother and babe both in good condition. Indications on the chart were flat pelvis and malpresentation. Position of baby was not given, neither were there any x-ray or pelvic measurements charted. Baby weighed 8 lbs.

Case 2 (8722) Age 20, primipara; labor began 2:30 a. m. at 15-20 minute intervals. Entered the hospital at 7:40 a. m. Vaginal examination made at 8:15 a. m. No dilatation. One oz. magnesium sulphate given. Pains increased to 4-5 minutes intervals and lasted 40 seconds. 1:30 p. m., rectal examination showed head low, little if any dilatation. Patient now complained of a severe and almost continuous pain in right side. Blood pressure 130/80, white count 19,100. 5:30 p. m. rectal examination, no dilatation. Prepared for surgery. Cesarian section. Appendix also removed. Pathologist reported appendix lumen distended, mucosa atrophied, chronic appendicitis. Mother and babe left the hospital in 11 days in good condition. Indications were dystochia. No pelvic measurements or x-ray pictures of pelvis.

Case 3 (9714). Age 24, primapara, admitted 10 p. m. for cesarian section. No pains, no discharge. B. P. 110/70. 11 p. m. 2 oz. castor oil given. 2:25 a. m. patient states membranes ruptured. Pains every 4 minutes, sharp but of short duration. Bloody discharge. Rectal examination at 4 a. m., one finger dilatation, head low, pains at 6 minute intervals. 7 a. m. to surgery for cesarian section. Baby had a large meningocele at base of skull size of an egg. Both mother and babe left the hospital on the second day, apparently in good condition. Indications were flat pelvis, overdue, malpresentation. No pelvic measurements or x-ray pictures.

Case 4 (9131). Age 29, para II, first child 11 years old; a difficult prolonged labor; instrumental delivery; birth weight not given. Jan. 23d an irregular firm mass extending two inches above umbilicus, cervix high in vagina; mass did not fluctuate but was quite tender. March 22d, tumor seemed much softer and larger. Patient was pregnant, had felt motion since March 5th. June 2d, cervix small, about level of upper border of pubis. General impression of a tumor mass in left pelvic region. X-ray report, fetus in upper abdomen, head under costal arch, breech down. The fetus is abnormally high in abdomen, and lateral view which shows the contour of the fetus confirms the diagnosis of some tumor mass in the pelvis. Physicians agreed to a possible tumor and cesarian section was advised. She went into labor July 21st. Under ethylene anesthesia, the abdomen was opened, a large thin walled ovarian cyst was delivered. It ruptured and contained a thin limpid straw-colored fluid. This was clamped off and the uterus opened. A 6½ lb. female child was delivered.. Lower in the pelvis there was a large thin wall cyst which also ruptured, showing the typical contents of a dermoid. A cigarette drain was inserted to the bottom of the pelvis, and abdomen closed in the usual manner. She returned to bed in fair condition. She had a continued fever following the operation. The urine became scant. Uremia developed. She died on the 7th postoperative day. Baby was in good condition. Indications, pelvic tumor, previous difficult labor.

Case 5 (8731) Para III, age 43; first two labors normal. Entered hospital 7:50 a. m. Had a convulsion previous to admittance. B. P. 180/100. Given 2 ampules mag. sulph. 50 per cent. Intravenous normal saline 100 cc. Mag. sulphate 4 cc. 50 per cent solution. 100 cc. of 50 per cent glucose. 8:50 blood pressure 170/95, pulse 80 to 86. To surgery at 10:30 a. m. for cesarian. Left hospital on 9th day. Both mother and babe in good condition. Indications; eclampsia.

Case 6 (9191). Age 24; primapara; had recently been in sanitarium in California with following report: Physical findings on admission, fine moist rales in both apices. There was no moisture heard at time of discharge. Sputum consistently negative. Temperautre range for month previous to discharge 98.2 to 99. X-ray interpretation; increased prominence of both hili. Shadows with dense opacities. There is an infiltration in upper left as low as 2d rib somewhat mature, but activity cannot be excluded from film. There is more diffuse infiltration in right upper as low as 3d rib also mature.

Cesarian section was done. Mother developed marked mental symptoms which persisted while she was in the hospital. Baby did well. Indications tuberculosis, contracted pelvis. No pelvic measurements or x-ray pictures of pelvis.

Case 7 (9723). Age 24, para II; first baby age 4, weight 9½ lbs., hard labor, low forceps. She was in labor 53 hours—head still high, cervix thick. Consultant advised cesarian. Mother and child left hospital on 10th day in good condition. Indications; hard labor for many hours; head high, thick cervix.

Case 8 (9273). Age 24, primapara. Entered hospital Aug. 18. left next day. Pains ineffectual. Reentered Aug. 21, 3:00 a. m.. pains every 6 minutes lasting 60 seconds. Vaginal examination at 8 a. m., no report recorded. Severe pains every 2-3 minutes. Cesarian section at 1:15 p. m. Consultation agreed to cesarian section. No pelvic measurements nor x-ray. Indications given as dystocia. contracted pelvis.

Case 9 (9870) Age 18, primipara. Hyperemesis gravidarum. First admission treated for hyperemesis and hypertension. Second admission treated with glucose intravenously without decrease in vomiting. X-ray of pelvis, moderate justo-minor pelvis. Head partly rotated and flexed in O. D. P. Anterior posterior measurements between sacrum and symphysis shown in lateral view, seems to be rather short for the size of head. Cesarian section. Mother and babe did nicely. Indications fulminating toxemia of hepatic type.

Case 10 (9848). Age 24, primipara. Entered the hospital for cesarian section. Blood was typed and urine examinations made. Blood pressure and urine were normal. No x-ray or pelvic measurements given. Indications, small pelvis and fibroid of the uterus. Both mother and babe in good condition.

Case 11 (9819) Age 34, para 7. Admitted in wheel chair complaining of excruciating pain in abdomen. Uterus firmly contracted. No fetal heart tones heard altho they were strong the day before. The patient soon was in shock, pulseless, considerable hemorrhage from the vagina. Cesarian section was immediately done. Transfusion done in operating room. Patient still in hospital. Baby did not breathe, heart tones absent, about 3 oz. of bloody fluid escaped nose and mouth of infant. Indications, abruptio placenta.

Case 12 (9840). Tiny female about 4 ft. 8 in. high, age 24, para II. Previous cesarian section. Pelvis extremely narrow and contracted. Baby weight 5 lb. 9 oz. Indications, contracted pelvis and chronic spondylitis. No x-ray or pelvic measurements given.

Case 13 (9001). Very tiny female, age 17, primipara. Entered hospital 1:45 a. m. Pains 1½-3 minutes. Vaginal examination at 3 a. m. 2 finger dilatation. 4 a. m. cesarian. Baby weighed 7 lb. 8 oz. Mother and babe in good condition. No x-ray or pelvic measurements. Indications, contracted pelvis.

Case 14 (8565). Age 40, primipara. Cesarian section, term pregnancy. Baby weighed 7 lb. 11 oz. Indications, arrested tuberculosis and contracted pelvis. No pelvic measurements or x-ray pictures of pelvis. Mother and babe in good condition.

Case 15 (8733) Age 23, para II, first child difficult labor with dead child. Cesarian section; babe weighed 8 lb. 15½ oz. There were no pelvic measurements or x-ray reports. Indications, flat pelvis and deformed anterior placed coccyx. Previous difficult labor with dead child.

Case 16 (8185) Age 43, para II; previous cesarian for eclampsia. Cesarian section, mother and child in good condition. Indications, previous cesarian, contracted pelvis. Pelvic measurements were recorded. Baby weighed 7 lb. 3¾ oz.

Case 17 (9089). Age 32, para V, children ages 14, 13, 12, 5. All previous pregnancies normal. Average birth weight about 9 lb. This patient was about 7 months pregnant. Blood pressure and urine normal. Baby weighed 2 lb. 15 oz. Lived two days. Indications; fractured pelvis. There was no history of when the pelvis was fractured and no x-ray pictures of the pelvis showing any deformity or callus formation, which might have caused a difficult labor.

Case 18 (7966). Age 29, primipara. In labor 24 hours, no progress. Rectal and vaginal examinations report head high. Cesarian section was done. Mother and babe in good conditioon. Baby weighed 7 lb. 7 oz. No pelvic measurements or x-ray pictures of pelvis. Indications, pelvic outlet too small for delivery of child's head. No progress in 24 hours labor.

Indications for Cesarian section:

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|---|---|
| Contracted pelvis | 4 |
| Flat pelvis | 3 |
| Dystocia | 3 |
| Appendicitis, dystocia | 1 |
| Eclampsia | 1 |
| Fractured pelvis | 1 |
| Abruptia placenta | 1 |
| Small pelvis, fibroids | 1 |
| Deformed and contracted pelvis | 1 |

## COMMENT

One physician had eight cases, one had five cases, five had one case each. One mother died of uremia. Two babies died, one of prematurely and one following abruptio placenta. Pelvic measurements are recorded in two cases only; x-ray examinations are recorded in four cases. Twelve cases had neither pelvic measurements nor x-ray examinations of the pelvis. Two mothers had had previous cesarian sections. There were five low sections and thirteen classical operations. There were nine multiparas and nine primiparas. Four miltiparas had had previous normal deliveries. Three multiparas had had previous instrumental deliveries. One had had a difficult labor with dead baby.

## RECOMMENDATIONS

Every pregnant woman entering this hospital must have her blood pressure taken immediately. This is necessary, because not a few pregnant women with supposedly good prenatal care have never had blood pressures taken. I think this hospital should require external pelvic measurements to be made on all obstetrical patients, preferably by the house physician.

Last year, the examiner for the American College of Surgeons complimented the hospital very highly on the lack of cesarian sections. Perhaps they will examine our charts more carefully this year when they see the large increase in cesarians. From the facts recorded in these eighteen charts, it would appear that section was not clearly indicated in all the cases. Let us make our records so complete and accurate that we will not be criticized for cesarian sections in patients who could probably have been safely delivered from below.

## DISCUSSION

DR. DUDLEY FOURNIER:—Cesarian section is the generalissimo of surgery and rightly so, for upon it depend two lives and it, therefore, should have very definite indications. Abdominal section is the quickest method of effecting delivery and one that entails least risk of sacrificing the child. When compared with the process of dilatation and expulsion, section promises delivery which may be said to be immediate. Because section puts an end to pregnancy and terminates labor at the same time, it has a definite place in the management of those cases which demand a quick emptying of the uterus, and also in those in which delivery cannot be effected from below, because of the probable loss of the mother or child or both.

The indications for cesarean section are more or less standardized and the actual necessity for section does not occur very often; when the obstetrician has recourse to it he acknowledges that the measures he usually employs are inadequate and he turns to this surgical procedure no oftener than the interests of his patient demand. Cesarean section offers such easy solution to grave obstetrical problems that its appeal is often difficult to resist.

The first indication for cesarean section is absolute pelvic contraction. The contraction is absolute where disproportion is so marked that delivery of a living child by the vaginal route is improbable. The contraction may be relative or actual. It is relative when the presenting part is overlarge for the pelvis through which it must pass, and it should be borne in mind that contraction may be absolute even though the pelvic measurements are normal.

This variety of contraction is of far greater clinical importance than the actual. One more often meets an overlarge unengaged head than a markedly undersized pelvis. Cephalmetry and particularly radiography are the aids to be made use of in diagnosis. Pelvimetry in these cases offers nothing. Actual contraction exists where the internal conjugate is shortened to 7 cm. in simple flat pelvis and to 7½ cm. in justo minor flat and where the bisschial diameter is no longer than 5.5 cm. In these cases where the patient is at term, delivery by other than abdominal section is not to be considered.

Second indication: pelvic tumors obstructing advance of the fetus. Under these conditions section alone assures birth of a living child. Uterine fibroids are not uncommon; they grow rapidly during pregnancy; ovarian cysts are rarely obstructive.

Another indication, on the part of the child, is prolapse of the cord. Nowadays there is so much importance attached to the life of the child that delivery by section should be considered if the cervix is not easily dilatable. Habitual death of the fetus in or just before labor is another indicator.

Antepartum eclampsia section is an emergency measure and should only be considered when conservative methods of treatment have failed, as the mortality rate of section in these cases is notoriously high.

Accidental hemorrhage; prompt section may offer the only chance for the mother's life in grave accidental hemorrhage with an undilated or undilatable cervix. A uterus rapidly increasing in size, markedly tense and tender and the general signs of internal hemorrhage with the disappearance of fetal heart sounds is all the evidence one needs for section. With hemorrhage concealed the demand for rapid delivery is urgent. Minutes count in cases of this kind and one must hurry in the preparation of the case.

In placenta previa, I believe section is indicated to obviate the probable loss of the child and in central placenta previa it is absolutely indicated. The operation should be elective and should be done before the placenta can be palpated through the dilatory cervix.

Grave uterine dystocia; this condition obtains where a contraction ring has been found impassable and where the uterus is tonic. Section in these cases affords the only assurance of obtaining a living child and removes the menace of uterine rupture. Early stillbirth due to accidents at delivery, that is, the so-called border line cases of pelvic contraction.

Lastly, previous delivery by section: The benefits accruing from repeated section are, the certainty that a living child will be born alive, and that assurance that the mother's life will not be lost in labor through rupture of the uterus at the site of an early incision. Previous cesarean section is not of itself an indication for abdominal delivery but it is the presence of a specific indication that calls for the repetition of section in a subsequent pregnancy.

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## Good Samaritan Hospital (Phoenix)

**(Report of Records Committee on deaths during October, 1930, with comments by Dr. W. Warner Watkins, Chairman.)**

Very briefly we will list the fourteen deaths occurring during October, and from these select three for comment:

9571:- Male, age 70; entered Oct. 5, died Oct. 7. Hopeless fracture of the skull from auto accident.

9565:- Female, married, age 42; entered Oct. 5, died Oct. 7; extensive burns.

9706:- Female, married, age 21; entered Oct. 24, dying same day. Bullet wound in abdomen. Autopsy showed injury to abdominal aorta with fatal hemorrhage.

9704:- Male, age 38; entered Oct. 24, died Oct. 25. Auto accident; multiple rib fractures and rupture of left arhpadigu'ms cmfwyp mfw vbgkq mfwypaoao left diaphragm; operation showed stomach and small bowel coils in left thorax; these were replaced in per toneal cavity and rent in diaphragm repaired. Death from shock. The question here was whether the operation should not have been delayed until the patient was in better physical condition. This case is referred to the Surgical Committee for consideration.

9277:- Female, married, age 76; entered Aug. 17, died Oct. 1. This old lady had a fractured hip, with history of nephritis and high blood pressure. The thing always dreaded in such cases developed here and she died with broncho-pneumonia.

9554:- Female, age 34, married; entered Oct. 2, died Oct. 10. Vaginal bleeding and mass in right lower quadrant. Exploratory laparotomy and supravaginal hysterectomy, including large blood clot in pelvis. Examination showed ruptured tube with evidences of tubal pregnancy. Death on fifth day following operation. Question:- Is hysterectomy an advisable procedure in a patient suffering the shock of a ruptured tubal pregnancy? This case is also referred to the Surgical Committee for study and consideration.

9384:- Male, widower, age 70; entered Sept. 3, died Oct. 1. Diagnosis of dilatation of heart and chronic parenchymatous nephritis, aortic insufficiency and stenosis, myocarditis. Showed loud diastolic and systolic murmurs over aorta, no shock or thrill. B.P. 160/70. Probably a vascular nephritis. Did time permit we should like to discourse on the diagnoses of myocarditis so frequently seen on our records.

9663:- Male, age 80; entered Oct. 18, died Oct. 19. Strangulated internal hernia and bowel obstruction therefrom. No external evidence of the hernia. Died soon after operation.

9597:- Three weeks old baby, entered Oct. 9, dying same day. Autopsy showed enlargement of thymus and patent foramen ovale. Mother had given ten drops of paregoric. Several points of interest in this case, but we are taking the time on some other cases.

9553:- Boy, age 15, entered Oct. 2, died Oct. 3. Had a well developed case of tetanus from wound on heel three weeks previously. Lived only a few hours.

9605:- Newborn babe, premature. Mother had necrotic placenta. Perhaps deserves some study but will not get it this time.

The three cases selected for comment are the following:

Case 9613:- Female, married, age 64; entered Oct. 5, died Oct. 7, from arsenic poisoning.

Case 9606:- Six months old baby, entered Oct. 10, died Oct. 21. Diagnosis of tuberculous meningitis; spinal fluid examination was made, and tubercle bacilli not found. History of close contact with case of tuberculosis.

Case 9621:- Female, single, age 55, entered Oct. 12, died Oct. 14. Note that she was suffering from asthma and was irrational. No diagnosis history, or physical examination on record.

With regard to the case of arsenic poisoning. One of the interesting developments of this case was the flowering forth in connection therewith, of a legitimate successor to Sherlock Holmes. This apotheosis of deductive genius took place in the Path-

ological Laboratory and involved one Mr. Clarence N. Boynton, serologist and chemist. With the modesty which so characterized his illustrious predecessor, as delineated in the stories by Sir Conan Doyle, Mr. Boynton's name does not appear in any of the newspaper accounts of this case of poisoning, the mystery of which he solved without moving out of his chair, and the duty devolves on me to do him justice in the matter. When first called on to make a toxicologic examination of the stomach contents from the two poisoned people, he found arsenic; this satisfied the medical phases of the case and the physician, having thus established the cause of death, turned the case over to the coroner, and these comments are intended as a criticism of the procedures of coroners under the Arizona statutes which are now more than a thousand years out of date. Early in the development of the case Mr. Boynton deduced certain facts and called the coroner on the phone with the suggestion that some one search for an extra can of baking powder and, if more than one were found, bring all to the laboratory for analysis. For some reason this was not done. The defunct lady had a brother, a detective from Denver, who came to Phoenix with the determination to solve the mystery; Mr. Boynton made to him the same suggestion, but the detective, apparently unable to apprehend the ratiocination of higher intelligence, failed to act on it. This was an interesting parallel to the situations which Sherlock Holmes was wont to encounter with the official detective agencies. After the two victims of poison had been buried, some other member of the family sent still other detectives to Phoenix to see if they could not learn the source of this arsenic. Mr. Boynton suggested that they search for two baking powder cans, and when they were found, to bring them both to the laboratory, and he (Boynton), would almost guarantee that one of them would contain the elusive arsenic. They soon returned with two baking powder cans one of which contained pure arsenic, bought and partly used by a former occupant of the house as a rat poison; this poison the wife had mistakenly used for baking powder in making the morning hot cakes for her unfortunate spouse. Mr. Boynton will not wish to have any more such cases brought to him, unless they prove to be beyond solution by the average intelligence. His deductive skill, while entirely capable of solving such elementary matters as this, is devoted to the solution of baffling laboratory problems connected with clinical medicine.

This case illustrates very well the necessity for a different type of coroner than the Arizona statutes provide for its citizenry. Time does not permit a discussion of the proper functions, qualifications, and activities of a coroner, although they are well worth studying. The office of coroner was established in medieval times, the function of the officer being to see that the personal belongings of people found dead should revert to the crown, the name originally being "crowner." Out of this conception has developed the modern office of coroner, when it has developed at all, who is empowered to investigate into the causes of death occurring without evident reason, and to set in motion the machinery of the law when a crime is found to have been committed. In Arizona, as in many states, the office has never advanced beyond the fourteenth century idea, even the very wording of the statute being medieval, the justice of the peace being ex-officio coroner and his chief stated duty being to see that the personal effects of people found dead are turned over to the county. He is required to investigate the causes of death, though it is not required that he have any qualifications whatsoever for such a delicate task, either in medicine or law. In more enlightened communities, the coroner is an appointed officer and must have training in the duties of the office, which are partly legal and partly medical.

The death of the six months old baby with tuberculous meningitis with history of close contact with an open case of the disease, shows that society is still murderous in its organization. The only clinical feature of the case worthy of comment is the failure to examine the spinal fluid for chlorides. That is the only test, except search for bacilli, which could have thrown light on the suspicion of tuberculous meningitis.. The chlorides normally are about 720 mgm.; if they fall below 650 mgm., tuberculous meningitis is almost certainly present. The clinician sending in spinal fluid must either state what disease he suspects or must have knowledge enough of laboratory tests to ask for the indicated specific tests. If he did not do this in this instance, the laboratory cannot be blamed for omitting the chloride test which is not a routine examination; if the clinician did say he suspected tuberculous meningitis, then the laboratory is at fault for not performing the test for chlorides and reporting the result.

In connection with this case it has been interesting to review some of the developments in the campaign to prevent tuberculosis in infants and children. In France and some other European countries this child would have been given BCG, (Calmette's vaccine). The American medical literature contains some interesting and violently divergent viewpoints on the use of this vaccine.

BCG vaccine is the discovery of Prof. Calmette, Assistant Director of the Pasteur Institute in Paris and his co-worker, Guerin, a veterinary surgeon. It consists of living, slightly virulent tubercle bacilli, bovine type, cultured on five per cent ox-bile glycerine for 21 years. It is claimed to have no virulence for the human being and is given to newborn infants during the first ten days of life. Each dose consists of 10 mgm. of moist bacilli in 2 c.c. of saline solution, containing approximately 1,200,000,000 bacilli. It is fed the babies by mouth on the third, fifth and seventh days of life. Up to a year ago approximately 200,000 infants had been vaccinated with BCG all over the world. The Public Health Committee of the League of Nations has expressed guarded approval of this vaccine. It is still being experimented with in this country, and varying expressions about it have appeared.

Petroff is the most vigorous opponent to the use of the vaccine; he gives a very critical and somewhat caustic analysis of Calmette's claims and statistics in the Am. Review for Tub. for September, 1929. In the same journal, Kareszturi and Park, of New York, recount their experiences up to that time and close with the cautious summary: "Oral BCG vaccination is relatively simple; it is harmless; it gives some immunity whose degree and duration cannot as yet be determined."

Gerald B. Webb (J.A.M.A., Nov. 9, 1929), closes a very excellent article with the statement, "I am of the opinion after careful study of the literature and after personal investigations and experiments, that BCG should be administered to infants born to parents with open pulmonary tuberculosis. With further proof of the harmlessness and efficiency of the vaccine, it may be found that all newborn infants should be vaccinated against tuberculosis with BCG." In the general discussion Pottenger, with his usual suavity, and Matson more bluntly, disagreed with Webb's conclusions. Petroff fears that

the advent of a vaccination method of preventing tuberculosis may cause a relaxation of the present methods of curtailing the disease by education, isolation and general hygiene. It is a question, however, on which well informed medical men should be posted. Looking over the list of published articles for the year between June, 1929 and June, 1930, there have been more than 150 articles on BCG vaccine, but only four in the American literature, and all of those last year. There have been none so far in 1930.

With regard to the case where no diagnosis, history or physical examination has been furnished, and concerning which the hospital historian says she can get no information from the doctor. Personally, we would like to know the technic of this doctor in getting into and out of the hospital, without giving the historian some information. We would like to learn the system, because we have found it impossible of accomplishment, without ungentlemanly rudeness to a very pleasant and charming young lady. This doctor apparently has reached the stage of life where, in addition to being insensible to his obligation to the hospital which shelters his patient, he is also deaf and blind to the delicacy of feminine appeal. When a doctor is blind to charm, deaf to duty, and insensible to criticism, the only commendable and useful thing left for him is to become a personal subject for study by the Records Committee,—preferably after a thorough autopsy.

## PITUITARY DISEASES
### Review of Current Literature

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Before opening a discussion on the review of literature regarding the pituitary diseases, I will first outline a few of the anatomical and physiological facts, or hypotheses, rather, that seem to dispose the various clinical syndromes. Anatomically the pituitary body is divided into three portions: pars anterior, pars intermedia, and part posterior. Clinically, however, the pars intermedia and pars posterior are rather difficult to outline. The hormone of the pars anterior affects chiefly the osseous tissue and the genitals, with hypersecretion producing gigantism and acromegaly after growth has ceased. The secondary effects on the dermal system are temperature, pulse, blood pressure and mental function. The hormone of the pars posterior chiefly affects metabolism. Hyposecretion produces increased carbohydrate tolerance of adiposity; hypersecretion, decreased carbohydrate tolerance with polyuria.

Among the different authors and workers on the problems there is much discussion regarding the variation of increase of carbohydrate tolerance from the condition of hyposecretion. Among these authors may be found the names of Engelbach, Sachs, McDonald and so forth.

In the clinic of Fred H. Mackay, in the Montreal General Hospital, he has attempted an anatomical classification of the various parts, or rather, a diagramatic scheme for dissection of the various parts, to attach dysfunction and resultant syndromes. From the dysfunction of the anterior lobe and the pars intermedia, he includes the basis for Froelich's syndrome, a disease of childhood with increased sugar tolerance, adiposity and inflammation of the genital system. On the other hand, hyperfunction before puberty producing gigantism and acromegaly and puberty, with a decreased carbohydrate tolerance, a stimulation of the pars sympathetic system with its action, of course, on plain muscle.

In a review of cases, by Henry J. John of the Cleveland Clinic, which showed clinical signs of hypertension, there were definite diabetic tendencies, with a definite decrease of carbohydrate tolerance in all. Considering that there should be an increased tolerance rather than a decreased, opens the subject to opinion, as it is not based on facts and reports quite thoroughly that there is a great deal more yet to know regarding anatomical isolation and pituitary function. However, we do know that dysfunction produces definite clinical pictures, and until further investigation can be made, scientific therapy will be impossible.

E. B. Fink, of Chicago, has classified a group of pathological entities. Pathologically, however, the majority of cases are determined only at autopsy. Those patients represent a clinical picture of brain tumor without localizing symptoms. The pathological changes that were noticed were most all of internal hydrocephalus, with marked protrusion of the floor of the third ventricle, thinning, an almost complete atrophy of the tuber cinereum and distention of the infundibulum, producing secondary optic atrophy and pressure on the hypopysis. Microscopically, the changes in the hypophysis indicated incomplete ripening of the epithelial cells of the anterior lobe. There was an entire absence of the symptoms which, from experimental evidence, might be expected to appear as a reuslt of compression of the tuber cinereum and the typothalamic region (polyuria, adiposo-genitalus, dystrophy.)

Among the mental disturbances associated with pituitary disorders, Wm. C. Menninger, of Topeka, Kansas, concludes from forty-two cases that there is no uniformity of association of any particular mental picture with any type of pituitary disorder. An unsatisfactory attempt to classify the mental reaction types under various pituitary groups disclosed: (1) a majority of the cases of pre-adolescent hypopituitarism showing some degree of retardation in intellectual development; (2) a majority of postadolescent hypopituitary cases presenting the schizoid picture; (3) predominance of cyclothymiac reaction in the late hypopituitarism. Such observations cannot be assumed to prove the relationship between any specific type of dysfunction and any specific mental reaction type. However, there is an intimate association between mental disorders and dyspituitarism in: (1) the concomitant development in children of pronounced pituitary disorder and mental retardation; (2) the concomitant onset and development of behavior disorder and the physical signs of dyspituitarism; (3) the subsequent development of mental changes directly dependent on the physical signs of dyspituitarism.

During the last year, Putnam, Benedict and Teel, of Boston, have made extensive studies in canine acromegaly by injection of anterior-lobe pituitary extract, and they have drawn the following conclusions: (1) Dogs which received daily, for fourteen months, a sterile aqueous extract from the anterior lobe of beef hypophyses, grew to almost twice the weight of the litter-mate control. They developed, among other conditions, enlargement of the acral parts, polyphagia, asthenia, sialorrhea and spontaneous lactation. The animals succumbed to myocardial failure and edema of the lungs. A skeletal overgrowth with hyperostosis, was present. There was a generalized splanchnomegaly, affect-

ing the thyroid and genital tract most strikingly. The thyroid was hyperplastic. There were adenomas of the suprarenal gland, and the ovaries contained ripe but unruptured follicles. (2) The condition produced appears to merit the designation of experimental acromegalia.

Edwin P. Bugbee and Oliver Kamm report investigation of the posterior lobe of the pituitary gland as follows: The posterior lobe produced two active principles. An oxytocic principle which causes contraction of the uterus and a pressor principle which raises blood pressure. These two active principles, before separated, are obtained in the form of a white, stable, water-soluble powder of great potency. The solutions of these separated active principles have been recombined to form a pituitary extract identical with the original from which they were prepared, thus proving that no decomposition has taken place. The oxytocic principle, which has been named alpha-hypophamine, causes contraction of the uterine muscle when injected into the normal animal, and contracts isolated uterine muscle when applied by contact. It is nearly free from action on any other form of smooth muscle. The pressor principle, which has been named beta-hypophalmine, does not affect uterine muscle, but stimulates other smooth muscles. It raises blood pressure, stimulates peristalsis in the gastro-intestinal tract, which has both a diuretic and anti-diuretic effect. It causes expansion of the melanophors in the skin of frogs.

The reports so far in this paper represent work that has been done within the last two years. There are a great many other treatises but they all group definitely around individual case reports with various and sundry forms of treatment, all of which differ daily in the intensity of the administration of extract in various forms and methods.

There is another group of pathological entities which come under the classification of brain tumor. The most frequent in occurrence is the adenoma. Fibroma and the rarer types will not be discussed here. They present a definite clinical picture of brain tumor with the clinical signs of headache, choke-disc, vomiting, and so forth. The most prominent localizing symptom of brain tumor is temporal heminopsia bilateri. The patient usually comes in complaining first of some or all of the cardinal symptoms of brain tumor, with a blindness slowly developing in the lateral fields. Other localizing signs may be present, depending upon the size of the new growth, its direction of growth, the anatomical position of the sella turcica. The treatment is surgical. To go into the surgical detail of pituitary disorders and treatment would be entirely too extensive for this treatise.

## CASE OF INABILITY TO WALK

(Case 16321, Cabot's Case Records; courtesy of Peter Bent Brigham Hospital. New Eng. Jour. of Med. Aug. 7, 1930, p. 281).

### Case History

Housewife of 36 entered December 3, complaining of inability to walk.

The family history and past history are not remarkable.

Present illness: Eight years ago the patient had acute shooting pains in the legs and was given six intravenous and numerous intramuscular injections. The legs were numb and she felt as if she "walked on feathers." Two years ago either leg would give way at times and she would fall, but recover immediately. She began to develop a peculiar gait, and nine months before admission her right leg suddenly ceased to function and could only be dragged along. There was no pain. After seven weeks in bed she found that she could walk, but had to hold on to something to keep from losing her balance. She had no tendency to fall in any particular direction. For the past twelve months her left leg had become progressively thinner. One month ago her hair began falling out evenly over the entire scalp. Three or four weeks ago both legs began to feel cold both subjectively and to touch. For the past four weeks the tips of her fingers had felt numb. For the past eight weeks she had often felt as if she had to void urine, but could not do so.

Physical examination at admission showed a fairly well nourished woman with prominent frontal bones. Scant, fine brown hair; no spotty loss of hair. Skin dry, with fine scaling. Left pupil egg shaped and larger than right; both reacted to accommodation but not to light. Retinal examination negative. Blood pressure 100/80. Heart, lungs and abdomen negative. Biceps and triceps reflexes hyperactive. Pain sensation absent in tips of all fingers. Deep sensibility present throughout both arms. In the legs the Achilles and Oppenheim reflexes and patellar reflexes were absent. No ankle clonus. No Babinski. In her toes she had no sense of perception in space. Heel to knee test showed marked loss of coordination. Marked ataxia and positive Romberg on walking and standing. Both legs markedly hypotonic. Heat and cold could be differentiated. Both legs of normal temperature. Pain sensation was absent over both legs throughout. The left leg showed diminished sensation to touch below the middle third of the tibia. On the right, pin prick and light touch were not appreciated below the upper third of the tibia anteriorly and below the Achilles tendon posteriorly. Vibration sense was absent in both legs.

Clinical and laboratory notes. For the first ten days of her stay the temperature, pulse and respiration were normal; she then had a slight chill, nausea, and vomiting and the temperature rose to 102° with pulse 100, following which the temperature remained between 99° and 102° for the remainder of her stay, with pulse of 100 to 120 and respirations 20 to 30. The urine was negative until the thirteenth day, when it was found to contain 15 to 25 leukocytes per high power field. All subsequent urine examinations showed specimens loaded with leukocytes. The blood on admission showed hemoglobin 70 per cent (Talqvist), 3,780,000 red cells, 13,250 leukocytes with 83 per cent polynuclears. The smear showed moderate achromia, marked anisocytosis and poikilocytosis, no stippling. The leukocyte count on December 13 and for the four following days was 12,500, 15,000, 12,800, 16,400 and 24,800; December 21 24,600, December 22 23,000, December 24 35,000, December 26 53,000. Wassermann positive, Hinton negative, modified Hinton positive. Stools not remarkable. Lumber puncture December 3: fluid clear, cell count 4, globulin negative, gold curve 4443331 (positive type 2), total protein 60, Wassermann (spinal fluid) negative. Lumbar puncture December 23: the spinal fluid was under a very low pressure, with practically no rise on jugular compression; cells 5, globulin (Panly test) ++, ammonium sulphate negative. Gastric analysis was essentially negative.

Course. For the first nine days in the hospital the patient's course was uneventful. On the tenth

day she had a chill, nausea and vomiting, with temperature rise to 102°. The temperature continued as given. On examination there was slight dullness over the left upper chest with fine crackling rales and increased breath sounds. She raised no sputum. The respirations never went above 30. An x-ray film of the chest next day was normal. On the fifteenth day the level of anesthesia was found to be unchanged since admission. The bladder showed retention of urine. She was catheterized several times following this and at other times was incontinent. She was given two doses of mercury succinamide intramuscularly and two of neoarsphenamine, but after the onset of temperature was given daily mercurial inunctions instead. She continued to grow weaker and remained unconscious for the last five days, with no other change except slightly weaker pulse. Twetny-four days after admission she suddenly became cyanotic and the respirations ceased.

The following diagnostic summaries were presented for this case at Phoenix Clinical Club, Sept. 29, 1930:

**Dr. F. C. Jordan, Phoenix, Ariz.**

This would be a classical case of tabes. The absence of reflexes, the Argyll Robertson pupil, the shooting pains in the legs, the ataxia, the sensory disturbances, are classed as the pathognomonic signs of tabes. There is an absence of the gastric crises and other similar pains that are found in nearly all cases of tabes. The gold curve is not like that of tabes but of general paresis. In paresis you would expect headache, speech disorders, behavior disorder, mental deterioration; none of these were present in this case. Syphilitic meningomyelitis, when affecting the posterior portion of the cord first, may have identical symptoms with those of tabes; usually there are more sensory findings, with pains more continuous and limited to the roots involved; ataxia is slight, if present; Romberg's sign is usually not present; muscular atrophies are not found in tabes but are present in syphilitic meningomyelitis. The chills from presence of many pus cells represent a terminal lesion which is quite a common termination of syphilis of the central nervous system; she probably had a cystitis or pyelonephritis, or a terminal broncho-pneumonia. We believe that this case was diagnosed tabes. Our diagnosis is (1) tabes; (2) syphilitic meningomyelitis with marked involvement of lower posterior cord. A sepsis, probably a pyelonephritis and broncho-pneumonia as terminal lesions.

**Dr. Frank J. Milloy, Phoenix**

This is a case of a patient with tabes dorsalis who has developed an acute terminal condition. This apparently was either an acute renal infection or an acute pulmonary condition. There is not much on which to base a suspicion of acute renal condition except the leukocytes in the urine. The very high white count strongly suggests a pulmonary condition. The few physical findings and the kind of death tend to support this suspicion. The picture does not exactly fit with pneumonia and I believe it must have been a pulmonary embolus with infarct.

**Dr. Howell Randolph, Phoenix**

This is a clear case of syphilis of the central nervous system, either alone, superimposed upon, or complicated by, some other neurological condition. No mention of mental symptoms is found in the history and the gold curve is strongly against general paresis. Practically all of the symptoms are explained by tabes dorsalis, although the trophic changes are a little more extensive than usually seen. Polyneuritis is fairly well ruled out by absence of pain over the peripheral nerves. Multiple sclerosis might give this picture, but the Charcot triad is not mentioned; namely, nystagmus, scanning speech and intensive tremor; multiple sclerosis may, therefore, be left out of consideration. Syringomyelia characteristically shows dissociated anesthesia. The immediate cause of death was probably pneumonia. However, there was a definite cystitis and probably pyelitis. Diagnosis: Tabes dorsalis; terminal pneumonia.

**Dr. Harlan P. Mills, Phoenix**

The history and findings of the physical examination suggest that we have a neurological condition, as the symptoms and signs point to involvement of the central nervous system. There was probably no definite complication up to the tenth day in the hospital. Lightning pains, paresthesias, partial paralysis, trophic disturbances, loss of deep reflexes of lower extremities, with partial anesthesia and loss of coordination, the pupil changes, all point to lesion of lower neurons, and would be consistent with diagnosis of tabes dorsalis. However, the spinal fluid findings are not characterstic, a normal cell count, negative globulin and gold curve of 4443331 not fitting, with this diagnosis, this latter being the curve of paresis; however, the normal cell count and negative spinal fluid Wassermann would almost rule out paresis. The low pressure and absence of rise on jugular compression suggest some degree of spinal block. On the tenth day a complication developed, with chill and rise of temperature, leukocytosis and pus in the urine. The urinary retention which is common in tabes evidently resulted in back pressure, with hydronephrosis and later a pyonephrosis. Very probably a terminal pneumonia developed as a terminal complication. Diagnosis: Tabes dorsalis, with some general cerebrospinal involvement; pyonephrosis; bronchopneumonia.

**Dr. O. H. Brown, Phoenix**

The diagnosis of syphilis in this woman was evidently correct. The positive Wassermann after extensive treatment, substantiates the diagnosis. The history of numbness, snesation of "walking on feathers," peculiar gait, difficulty in walking and inability to void, taken with the examination findings of Argyll-Robertson pupil, absent patellar, achilles and other feet reflexes, absent muscle and joint sense in toes, ataxia of legs, positive Romberg, hypotonia of legs, absence of vibration sense, definite skin anesthesia, etc., especially with the history of syphilis, warrant a diagnosis of tabes dorsalis. There are peculiarities in the spinal fluid tests. Ordinarily the Wassermann will be positive in spinal fluids of tabetics. As nothing is reported of the spinal fluid Wassermann it presumably was negative or was not done. The gold chloride curve is a bit unusual; there should be seven figures; I suppose the two zeros have been omitted from the right. About half the tabetics have a paretic curve, such as 555543200. A typical syphilitic curve runs 223455300. Men who are accustomed to doing the gold chloride test say that it is unusual to have a 444333100 reaction, that the indications are that the solutions were insensitive and that the fours should be read as fives. In such an event the reaction would be a paretic reaction. Hazen says about half the tabetics give a paretic reaction. The

other half give a syphilitic reaction in which the high point is in the middle. I believe it necessary to conclude that the gold chloride test supports the diagnosis of tabes. The cell count is normal which is unusual. The increase of cells results from the meningitic feature of tabes. Evidently in this particular case the meningitis is negligible. The total protein is high; this is consistent with the diagnosis of tabes. The negative globulin of the first test is unexpected in tabes. The low tension of the spinal fluid is also unusual in tabes. Further the fact that there was practically no increase of spinal fluid tension from jugular compression suggests spinal canal obstruction between the brain and the point of withdrawal of the fluid.

The history and the examination findings both point only to the dorsal columns being affected. The changes are bilateral, therefore in the cord rather than in the brain. The fact that there are no symptoms of involvement of the lateral or ventral columns rules out simple myelitis and multiple sclerosis. It seems unlikely that a neoplasm could so nicely attack just the dorsal columns. I can arrive at no other diagnosis than that of tabes to explain the symptoms from the nervous system.

The development of chill, nausea, vomiting, fever, increased pulse, leukocytosis and unconsciousness indicate the developmnet of an acute condition which was responsible for her death. The findings in an area of the lungs of dullness, cracking rales and increased breath sounds would suggest the development of pneumonia which is not an infrequent cause of death in tabetics. The lack of increased frequency of respiration, of sputum, of cough and the negative x-ray rule out pneumonia. The other outstanding finding was pus in the urine. The number of cells were few at first but soon numerous. The fact that she had inability to void, even when the urge was definite, and then incontinence, suggests a long continual damming back of urine onto the kidneys. Such an issue is not an infrequent complication of tabes. The urinary bladders in tabetics are prone to develop trabeculae. These may prevent expansion of the bladder so that serious retention might be easily overlooked.

The rapidly rising leukocytosis to a high level, the persistent fever, the five days of unconsciousness and death are evidence of a marked focus of infection and general sepsis. The conclusion seems warranted that the back pressure of urine damaged the kidneys and that infection developed, resulting probably in abscess formation. Diagnosis: Sepsis; nephritic abscess; urinary stasis and destruction of kidney substance; uremia; tabes dorsalis; syphilis.

**Dr. Richard C. Cabot, Boston**

In most of the cases which we have discussed at this hospital this year the record starts in this way: "Family history and past history not remarkable." So far as concerns the family history that is what we usually have to say. It is in only a very small percentage of cases that we get anything of value out of the family history.

The sharp shooting pains in the legs were diagnosed, I suppose, as the lightning pains of tabes and she was given antiluetic treatment. Tabes is more common in men than in women.

The history of the present illness certainly points to some disease of the spinal cord. Of the diseases of the spinal cord tabes is suggested on account of the pains, the pupils, the ataxia, the bladder symptoms, the loss of certain reflexes, the hypotonicity and the positive Wassermann test.

The prominent frontal bones were possibly related to syphilis. The skin makes us think again of syphilis.

The description of the pupils is that of Argyll-Robertson pupils.

It is a pretty good rule that any sort of queer anomalies of sensation are consistent with tabes. It is hard to name any that are not.

We look for some intercurrent infection as a cause for all that rise in temperature and in the leukocyte count. It seems to be a urinary infection.

The abnormalities in the blood are perhaps due to the same condition that later caused the pus in the urine and the temperature. The smear is characteristic of secondary anemia. The cell count in the lumbar puncture fluid is against the diagnosis we have been making, but it is consistent with it in patients who have been under treatment for a good while.

It would be natural to suspect pneumonia and it was rather surprising to have a normal x-ray.

We can be positive she had chronic disease of the spinal cord. We can be positive she had urinary infection. I see nothing against tabes. I do not see how anyone ever can exclude multiple sclerosis in a case like this. It is a dangerous thing to exclude it in any obscure disease of the central nervous system. I am in favor of tabes.

**Dr. S. Burt Wolbach, Boston**

At post mortem the spinal cord showed on section sharply demarcated translucent areas scattered without any uniformity in the posterior columns, the anterior columns, the lateral columns. Upon examination of the brain we found scattered throughout the white matter gray or dark gray areas widely distributed. In the occipital region there was quite a large lesion. Histologically these lesions were characteristic of those described as multiple sclerosis, the loss of myelin sheaths accompanied by very marked gliosis. The more recent lesions contained lipoid laden cells and perivascular lymphoblastic infiltrations such as have been described in multiple sclerosis.

There was an acute bronchopneumonia.

Then we had a finding which we cannot account for satisfactorily, a thrombosis of the lateral sinus, puriform thrombi with leukocytes and bacteria demonstrable in the smear. I cannot explain this, although I think it is of some importance in explaining the terminal events in the patient's life.

I forgot to mention that there was cystitis and pyelitis. We interpret that as of paralytic origin.

There were thrombi in the pulmonary arteries I presume that and the lateral sinus were connected.

Dr. Cabot: Anybody who is willing to exclude multiple sclerosis in such a case when he remembers the extraordinary number of clinical pictures which we have seen associated with it is a rash man. I think we can scarcely exaggerate the variety of clinical pictures we can get with multiple sclerosis. The only thing that was much against tabes was the cell count in the spinal fluid, and if there had been very active treatment recently that would not have been at all extraordinary. Certainly there are few cases of tabes that show no increase of cells.

Q. Did any of the clinicians who saw this patient make the diagnosis of multiple sclerosis?

Ans. No; they merely brought up the possibility.

ANATOMIC DIAGNOSIS

Multiple sclerosis.

Acute bronchopneumonia.

Thrombosis of the lateral sinus.

## CASE OF UNEXPLAINED HEMATEMESIS

(Case 15452, Cabot's Case Records, from N.E.J. of M., Nov. 7, 1929, p. 948).

### Case History

First Admission. An American steamfitter fifty-eight years old was sent in by a physician July 3, nearly three years before his final admission, for study of anemia. The patient's own chief complaints were epigastric pain, rapid heart and weakness. He was so deaf that the reliability of the history is doubtful.

A year before admission he began to have a dull ache in the left epigastrium extending to midepigastrium and radiating to both lower chests, more often to the left. It occurred two or three times a week, usually about half an hour after eating, and was relieved by hot water and soda. It was accompanied by eructations of gas with partial relief. When untreated it usually lasted two hours. By regulating his diet, especially by avoiding greasy food, he found the attacks were infrequent and not troublesome. Seven months before admission he found on getting up in the morning that his heart was very rapid. He had no other cardiac symptoms. He had, however, often been dizzy in the past seven months. He stopped working for three months. The attacks of palpitation continued to occur at regular intervals with and without exertion and excitement. He was very weak during the attacks and sometimes in the intervals. In February he came to the Out-Patient Department. Examination showed the heart not enlarged, action slow, an apical systolic murmur. An electrocardiogram showed normal rhythm, rate 70. X-ray showed no evidence of organic disease of the stomach or duodenum. Basal metabolic rate -8. Blood: reds 5,070,000, slight variation in size and shape. In April he returned to work for six weeks. Then he had to stop on account of weakness and palpitation. For several months the attacks of epigastric pain had occurred after nearly every meal. During the past six weeks, he had had frontal morning headaches, relieved immediately on lying down. Two weeks before admission these stopped. He had recently noticed black stools and he thought some red ones. He had had no colic, vomiting, hematemesis, nausea or jaundice. He had some gas. He had lost possibly ten pounds since the onset. For the past three weeks he had felt better.

His family history is unimportant. His past history shows gonorrhea thirty-five years before admission, with no recurrence, many boils lanced eight years before admisson, and "catarrhal deafness" for six years.

Clinical examination showed an obese man lying quietly in bed in no apparent distress. Skin and mucous membranes somewhat pale, with only a suggestion of lemon yellow tinge. Heart moderately hypertrophied. A soft systolic murmur at the apex, transmitted to the axilla. Blood pressure 160/90. Abdomen soft; no spasm, tenderness or masses. Left indirect inguinal hernia and absence (congenital?) of left testicle. Rectal examination negative.

Uhine: amount not recorded, no abnormalities except 2 to 5 leukocytes at 1 of 44 examinations. Blood: 4,900 to 7,100 leukocytes, 76 to 60 per cent polymorphonuclears, hemoglobin 50 to 70 per cent, reds 1,850,000 to 3,900,000, one smear normal, one showed slight achromia, a third some poikilocytosis with an occasional tailed cell, marked anisocytosis with many macrocytes, platelets reduced little if at all. Wassermann negative. Fasting contents of stomach: 10 c.c. cloudy grayish sour material, free HC1 4, total HC1 32, guaiac negative. Test meal: 22 c.c., similar material, free HC1 32, total HC1 52, guaiac negative. Stools negative.

X-ray examination with a barium enema showed no evidence of organic disease of the colon. Examination of the chest showed the lungs clear except for several calcified glands at each hilus. The cardiac shadow was slightly increased both to right and left. (Right 5.7 cm., left 9, chest 26.)

Pulse 100 at admission; otherwise chart not remarkable.

The patient did extremely well on the Minot-Murphy diet. He had no attacks of palpitation or other symptoms. July 14 he was discharged.

History of interval. After leaving the hospital he continued to do very well on the liver diet, though he still had attacks of palpitation. He was troubled with gas by mouth and by rectum, often accompanied by dull burning sub-sternal pain usually occurring at bed time, never severe, relieved by belching and soda. Occasionally he induced vomiting for relief of gas. For three months before his second admission he had felt in relatively excellent health except for inconvenience from his inguinal hernia. Three weeks before his second admission this became irreducible and very painful.

Second admission. December 6, seventeen months after his discharge, he reentered.

He was now well nourished, not obese. The hernia was successfully reduced on December 24. Then he vomited coffee grounds material and passed tarry stools for the next four days. On examination December 28 his skin and mucous membranes were pale. Rectal examination showed tarry stools which gave a strongly positive guaiac.

Laboratory data after December 28. Urine: amount not recorded, no abnormalities except rare leukocytes at four of five examinations. Blood December 28: hemoglobin 55 per cent, reds 2,208,000, no achromia (reds showed more hemoglobin than normal), marked anisocytosis with scattered macrophages, moderate poikilocytosis; intense polychromatophilia, no stippling; 10,000 leukocytes, 70 per cent polymorphonuclears, numerous young polymorphonuclears and others with multilobular nuclei; reticulated cells 13.1; platelets appearing normal. Clotting time 4½ to 5 minutes. Fragility test began .46, complete .38. Non-protein nitrogen 31 mgm. January 9 hemoglobin 65 per cent, reds 3,800,000 slight achromia and variation in size, a few diffuse basophilic cells, 6,500 leukocytes, a few immature polymorphonuclears, platelets normal, reticulated cells 1 to 2 per cent.

Chart after December 28 not remarkable.

December 31 the stools gave a very strongly positive guaiac. The patient was symptom free, however, and after January 1 the stools were negative. January 12 x-ray showed a large accessory pocket arising from the posterior gastric wall just off the lesser curvature. The rest of the stomach and duodenal wall were normal. At twenty-four hours the head of the barium column had reached the rectum; the pocket in the stomach wall remained filled.

The patient continued to gain. A surgical consultant advised postponing operation as long as the patient was comfortable on medical treatment. January 23 the patient was discharged.

History of interval: He kept faithfully to the re-

gime prescribed, gained in strength and weight and was symptom free for the first seven months except for gas and sour eructations. Seven months before his third admission he began to have cramp-like pains in the medepigastrium, constipation and gas. X-ray showed a "pocket in his stomach." Four weeks before readmission he began to have slight cramp-like, gnawing pain in the epigastrium coming several times a day without relation to meals and lasting only a short time. April 21, after feeling very well, he had itching over the whole body followed by a chilly feeling, then by hot flushes. Later in the day he passed dark red stools.

Third admission. April 23, fifteen months after his discharge, he reentered.

On examination he was still well nourished, though he had perhaps lost some weght. The arterial walls were palpable and tortuous. Blood pressure 155/98 to 127/78. The fundi showed arteriosclerosis.

Before operation urine much as before, hemoglobin 50 to 60 per cent, reds 2,840,000 to 3,850,000, moderate achromia, platelets normal, 8,800 leukocytes, 72 per cent polymorphonuclears. Hinton negative. Stools tarry at three of seven examinations, guaiac strongly positive at four, positive at two more.

Before operation chart normal except for a rise in temperature (100°) and pulse (111) on April 29.

The patient had no symptoms. The stools continued however, to show a positive Guaiac. May 11 operation was done. The wound showed some serous discharge and was somewhat slow in healing. Following a sneeze it was found wide open. During anesthetization for resuture the patient strained, forcing out loops of small intestine. He developed a pneumonia. The wound showed pus. June 7 he died.

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**Discussion by Dr. Howell Randolph, Phoenix**

There are very few symptoms in this case that can not be explained by one diagnosis, and that diagnosis related to something wrong with the stomach or upper gastro-intestinal tract. The chronicity and periodicity of the attacks are characteristic of ulcer of the stomach or more commonly ulcer of the duodenum.

Stewart, in 1500 necropsies, found 8.7 per cent ulcers, equally distributed between stomach and duodenum. He states that the chronic ulcer is more common in the duodenum, 3.9 per cent against 1.9 per cent chronic ulcers of the stomach. Acute ulcers of the stomach are usually multiple although chronic gastric ulcers are almost invariably single. Perforation and hemorrhage from gastric ulcer are almost always found in the acute type of ulcer. If symptoms of ulcer have persisted for a long time prior to hemorrhage the chances are that at the post mortem acute secondary ulcer will be found to be the site of the hemorrhage.

In this case the acidity is not altered to any extent. Few clinicians now accept the presence of high acidity as a factor in the etiology of gastric ulcer. Hyperchlorhydria is probably secondary to ulcer irritation or to accompanying surrounding acid gastritis. High acid has been shown not to be the cause of the pain in ulcer as the more severe pain is not found to correspond to the high point on the acid curve. Pain has been shown to be most severe at the time the paristaltic wave passes the site of the ulcer and the duration of the pain spasm is definitely related to the duration of the spastic contraction of the paristaltic wave at the site of the ulcer. Acid values vary more with the site of the ulcer than with the duration. If the ulcer is not placed near the pylorus the acid values are seldom much altered. If there is a certain amount of stasis due to pyloric spasm, the acid will rise, evidently in an attempt to open the pyloric sphincter. The symptom of pain after meals which has been interpreted for so long as diagnostic of ulcer, is of considerable value in localizing the lesion. If located on the fundus of the stomach, pain will come on in one-half to one hour after meals, depending on the size of the meal and the extent of the ulcer and the amount of pyloric spasm. If located at the pylorus, pain will come on one to one and a half or two hours after meals, and if pain comes on five or six hours after meals the location of the lesion is most likely to be duodenum. If pain becomes more constant and more of a soreness, the probabilities are that the ulcer has become of the perforating type and that adhesions have formed to some other viscus.

It may be that a history of relief from pain in certain postures may be elicited in this type of case.

The string test is one which has been used with some success in locating ulcers. This consists of requiring the patient to swallow a small bead tied to a string which is long enough to allow the bead to pass down as far as the upper duodenum. After the string has been in place all night it is removed. Bile stains will be seen at the site of the ampulla of Vater and ulcer stains will be shown at some point higher on the cord. This gives the exact distance of the ulcer from the ampulla.

In the present case it would seem that the entire picture is explained by gastric ulcer not discovered on first examination but later perforating to form a diverticulum on the posterior wall of the stomach. Repeated hemorrhages would account fully for the blood changes even to the count which showed color index of more than 1, as this is not an infrequent occurrence in severe secondary hemorrhage. Each hemorrhage has probably been caused by an increase in the ulceration. Carcinoma is hardly likely in this case as patient is well nourished and the hemorrhages are not characteristic.

The cause of death was peritonitis and pneumonia. The stomach pathology was perforating ulcer with diverticulum. There was hypertension and arteriosclerosis which contributed to the causation of hemorrhages.

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**Discussion by Dr. Orville H. Brown, Phoenix**

The criteria to the diagnosis seem to lie in the second paragraph: Indigestion, periodically rapid heart, palpitation, profound weakness, apical systolic murmur, frontal morning headaches, black tarry stools. He had been ill for seven months. Blood count and metabolism were normal. X-ray of gastrointestinal tract was also negative. Presumably the thyroid was normal. The one definite thing in this record, so far, is the cardiac murmur. The blood in stools may be a valuable symptom or it may mean nothing as far as present knowledge goes.

At the time of entering the hospital the heart had become moderately hypertrophied which means dilated and the systolic murmur was transmitted to the axilla. By this time he had become markedly anemic. The anemia, except for the absence of normoblasts and megaloblasts, might be considered

typical of pernicious anemia. The high color index especially was suggestive of pernicious. The color of the blood suggests a bleeding from high up in the gastrointestinal tract. Bleeding from alimentary canal is common in pernicious anemia. The vomiting of the coffee ground material indicates that the bleeding came from the stomach. The acidity of the gastric contents, however, was unusually high for pernicious anemia. Subsequent examinations have nothing to say of the cardiac condition; hence the heart must have improved. The bleeding from the gastrointestinal tract, however, continued and the anemia at times was a serious factor. At his second admission to the hospital an accessory pocket on the posterior wall of the stomach was found. This indicates an ulcer which had probably existed for a considerable period and probably explained the bleeding.

My diagnosis then is: Endocarditis; secondary anemia; gastric ulcer; gastric pocket; pneumonia.

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**Discussion by Dr. W. Warner Watkins, Phoenix**

This is an interesting and profitable case to study, because we have a condition to analyze which persisted more or less during four years, and yet which was not the immediate cause of death. In the end, following an operation for some condition which we have no reason to believe would have killed the patient, he contracted pneumonia and died.

The condition we are to study showed its first symptoms four years before death, by a dull ache in the epigastrium radiating to lower chest; this ache came on two or three times a week after eating and wore off in about two hours if untreated, but could be relieved by hot water and soda. By watching his diet and avoiding greasy foods, he could control the attacks. He suffered like this for seven months, during which time he was often dizzy, with palpitation not related to exertion, and weakness, forcing him to stop work during three months.

Seven months after this epigastric pain started, he came in February to the outpatient department for advice and was examined. They evidently suspected his stomach, his heart, his thyroid and his blood, because they examined all and found results all negative, except slight anisocytosis. In April he went back to work, and had to stop again after six weeks on account of palpitation and weakness, with the epigastric pain after nearly every meal; then he developed frontal headaches and noticed tarry stools.

That is his history for the first year, at the end of which period he came upto his first admission to the hospital,—in July. Since the physical and laboratory examinations which were all negative, he has shown one other symptom of importance; namely, tarry stools.

Have we any other possibilities than those mentioned above, namely:

Organic stomach or duodenal lesion.

Heart disease.

Thyroid disease or other endocrine disturbance.

Blood disease.

The type of pain and the effect of foods would bring the gallbladder into the picture for consideration.

With these things in mind, we pass to the first physical examination. An obese, pale man with only slight lemon tinge, whose heart appears enlarged with systolic murmur, normal blood pressure; no abdominal findings except inguinal hernia. This tells us only that the man is anemic, and anemia with obesity suggests pernicious anemia or anemia of internal hemorrhage. We come to the laboratory examinations with these two things well to the forefront in our minds. Urine helps us not at all, because incomplete. The first blood picture with its leucopenia, reduction in hemoglobin (50) but relatively greater reduction in red cells (1,850,000), normal cell color, variation in size and shape of reds, helps along the idea of pernicious anemia. The other count, showing rapid recovery of red cells, bringing the index below 1, weakens this possibility. Then the acid in the stomach, and negative stools (if they tested for urobilin) takes most of the foundation for diagnosis of pernicious anemia out. Barium enema examination of colon was negative and x-ray of lungs showed them negative, with heart shadow slightly enlarged. Where are we now?

We have insufficient basis for diagnosis of pernicious anemia, but less basis for anything else at this time. They evidently thought the same, because he was placed on the Minot-Murphy diet and sent on his way. He did fairly well, though his stomach symptoms continued during the next seventeen months. He had some palpitation and some trouble with his hernia; this hernia finally became irreducible and brought him back to the hospital in December, 17 months after his previous examination there. His hernia was reduced, and a little over two weeks later he vomitied coffee grounds and passed this tarry blood, when he again gave blood findings suggesting pernicious anemia; hemoglobin 55, red cells 2,200,000 being a plus index, and much variation in size and shape. A few days later his hbg. was 65 and red cells 3,800,000, and less variation.

At this time a barium meal examination of stomach showed an entirely new finding,—an accessory pocket arising from the posterior wall of stomach close to the lesser curvature, which remained filled when stomach was empty after 24 hours. He was placed on medical treatment, which we infer was directed toward the organic lesion of the stomach, which must have been taken for perforated ulcer.

We have all the essential facts and should make our differential diagnosis at this point, if we can ever make it.

Pernicious Anemia:- We put this first, because this was evidently the diagnosis first made by the physician in charge. Pernicious anemia has several characteristics which are well represented in this patient's symptoms. A persistent anemia, with weakness, palpitation, gastric symptoms, preservation of subcutaneous fat, remissions and recurrences in blood picture, hemic heart murmur, all suggest pernicious anemia. This, with improvement on the Murphy diet, would be sufficient for many people, but it should not be enough for those who possess the critical acumen of the members of this Club. Have we a right to diagnose pernicious anemia without achlorhydria, glossitis, sensory nerve disturbances, bilirubin in urine or stools? If we do, we should have a very characteristic and persistent blood picture to base it on, and this we have not. There is nothing anywhere in the blood picture that could not result from hemorrhage and rapid blood repair. The only unexplained symptoms are the weakness and palpitation appearing early, without known preceding hemorrhage. However, it is easily conceivable that this patient may have been having internal hemorrhages and never paid attention to tarry stools. We reject the diagnosis of pernicious anemia.

Heart Disease: We have palpitation, enlargement of heart, weakness, systolic murmur. We cannot find enough basis for diagnosis of heart disease.

Endocrine disease: Too little basis for this.

Liver or gall bladder disease:- Cirrhosis of the liver should always be thought of in hemorrhage from upper intestinal tract, but the course is long and there are no corroborative symptoms. The character of pain and its relation to food should make us think of the gallbladder, and if this pocket had not shown up, and if the hemorrhages had not kept coming, we would have considered t very seriously.

Organic stomach lesion:- Every symptom in this patient can be explained by ulcer of the posterior wall of the stomach, with repeated hemorrhages, and eventual perforation with formation of an accessory pocket. We must assume hemorrhages in the early stage of the disease and must assume that the ulcer existed at the first x-ray examination and escaped detection by x-ray. Posterior wall ulcers are the most easily overlooked. Analysis of the blood findings suggest to me rapid recovery from hemorrhage, rather than remission of pernicious anemia.

There is a secondary anemia of the pernicious type, regarding which Loewenberg has this to say:- "It is a form in which there is a great reduction in the erythrocytes, the presence of embryonic red cells, a moderate reduction in hemoglobin, resulting in a high color index, and little or no change in the differential leucocyte count. It is found in cases of prolonged hemorrhage, malignant disease, malarial cachexia, and certain intestinal parasites. Th peatient is pale, weak and dyspneic."

We have not taken up a discussion of malignant disease of the stomach, though this might well be considered and discussed. We do not see how a differentiation between benign ulcer with perforation and malignant ulceration can be made. The rapidly changing blood picture is more like ulcer with hemorrhage than malignancy.

Diagnosis:- Ulcer on posterior wall of stomach, with eventual perforation, and formation of extra-gastric pocket. Blood findings and accompanying symptoms due to secondary anemia following persistent and prolonged hemorrhage.

Cause of death:- Wound infection and pneumonia subsequent to operation.

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**Discussion by Dr. Chester M. Jones, Boston**

(Abstracted)

All we have up to the second admission is the story suggestive of gastro-intestinal hemorrhage with associated symptoms of anemia. I think the gastro-intestinal symptoms somewhat suggestive of ulcer. They have gone on for a year. Most of our patients with cancer of the stomach present a story of only a few months. This is rather longer than the history of the average case of cancer of the stomach. It is a little unusual in cases of peptic ulcer to have symptoms begin at the age of fifty-seven. We still have to consider two causes of tarry stools, polyposis, a very rare disease, and diverticulitis. Diverticulitis is very rarely associated with hemorrhage. Usually there is hematemesis with cirrhosis before we get tarry stools. But that has to be considered as a cause of the anemia which I believe he has.

The physcial examination does not help us very much. He is a little pale and there is a slight suggestion of lemon yellow tinge. The urine is essentially negative. He has an anemia; there is no question about that. His red count cannot have increased that much in eleven days unless he really had pernicious anemia and responded most promptly to the liver diet. Perhaps the blood counts are not entirely correct because of variations in blood-counting pipettes. It is fair to say this man has an anemia. I do not know how much it is, but it is fairly severe, somewhere near 3,000,000 with a hemoglobin of about 60 per cent. That is certainly not a very low color index, neither is a high one. There is no leukocytosis, and the differential count is normal. A diagnosis of achromia based on the smear is a very dangerous diagnosis to make, because in making a smear we sometimes squeeze the red cells too much, so that they look paler than they are. Those findings are entirely consistent with any chronic anemia, and we have every reason to doubt that Out-Patient Department red count. His doctor was probably correct, as doctors usually are when they send in patients with definite statements about them.

Macrocytes are supposed to be characteristic of pernicious anemia. If they were macrocytes I hesitate before saying the patient did not have pernicious anemia. We may have variation in the size of the red cells in any severe anemia. I am going to put a question mark after that blood smear. It is not sufficient to make a diagnosis on.

The stomach analysis shows that there is no stasis here. Those are perfectly normal stomach contents. That is very definite evidence against pernicious anemia. We have only one case of pernicious anemia on record at this hospital with free acid in the stomach contents, and I believe such a diagnosis here is untenable.

I think the diagnosis made at the first entry was probably questionable pernicious anemia. He left the hospital so far as I am concerned without a diagnosis except anemia, probably due to disease in the gastro-intestinal tract.

He comes in five months after his discharge with most of his symptoms improved. The anemia probably is very much diminished. His gastro-intestinal symptoms are much improved. He comes in for another reason, namely, hernia. One wonders whether hernia alone caused the previous story. I doubt it.

All the blood findings can be explained this time on the basis of brisk hemorrhage. Brisk hemorrhage with a good marrow should give a rapid increase in reticulated cells. It should give polychromatophilia, should give normal or increased platelets, should give poikilocytosis. I do not think the blood findings mean anything more than a normal reaction to fairly brisk hemorrhage.

The clotting time is normal.

The figures for the fragility test are closer together than normal, as is frequently seen immediately after a hemorrhage.

I should say he has a good bone marrow, and his blood has come back as well as any patient's under such conditions might. There is no evidence here of pernicious anemia. I am still against such a diagnosis. Pernicious anemia does not give gastric hemorrhages.

He can have logically one of two things—peptic ulcer which has been walled off and partially penetrated. Certain things fit in with this. The story is not atypical of ulcer more typical of a large diverticulum of the stomach which has become eroded. My diagnosis lies between those two diagnoses. He obviously has a large excavation connected with the stomach.

I do not think we need to consider other causes for hematemesis such as cirrhosis of the liver.

I should like to put in one more possible diagnosis, leiomyosarcoma of the stomach because of the ulcerative lesion. I should say leiomyosarcoma would fit in perfectly with the story. We have this excavation or diverticulum. So far as I know penetrating lesions do not occur in leiomyosarcoma. The

duration of the disease and the clinical story would fit in perfectly.

I presume the operation was resection of the ulcerated cavity or diverticulum.

PRE-OPERATIVE DIAGNOSIS

Carcinoma of the stomach.

OPERATION

Paramedian incision to the left of the median line. The spinal anesthesia was unsatisfactory and it was necessary to supplement it with ether. On exploration the stomach showed no evidence of carcinoma or ulcer. The pylorus was unusually large, with very little musculature. At the cardiac end near the esophageal opening there was a small pouch. Both the greater and lesser omentum were extremely fatty, so that exploration was extremely difficult. There was no induration or tumor anywhere palpable. The liver was about half normal size. It was smooth in contour and normal in color. It showed no signs externally of disease. The left lobe was almost entirely missing, so that the dome of the diaphragm could be plainly seen with the central tendon. The spleen lay in close contact with the esophageal end of the stomach. The gall bladder was negative. Palpation of the entire length of the large intestine was negative except that there were hard fecal masses in the sigmoid. The small pouch at the cardiac end of the stomach did not seem to correspond accurately with the x-ray picture, as it was about the size of the last joint of the thumb and had a good sized opening into the stomach. There seemed no indication to open into the lumen of the stomach. The wound was closed without drainage.

FURTHER DISCUSSION

He did have a diverticulum in the stomach. I think that is the reason for his bleeding. The variation from the x-ray picutres I think is very interesting. In the first place the difference in size between the x-ray and what they found. In the second place he may have had some ulceration. The actual lumen connected with that diverticulum was very small at times and may have been very small when he was x-rayed.

There is only one other possibility, that is the man may have a diverticulum which completely misled the surgeons. That is, he may have had cirrhosis of the liver with esophageal varices to account for the hemorrhage, and the diverticulum may have been put in to make it hard. It is usually true that diverticulum does not cause symptoms. The finding of a diverticulum is usually an x-ray finding. But I am not sure that in individual cases it can not cause symptoms. A pocket like this might well cause the symptoms of which he complained. I am under the impression that gastric diverticula bleed more frequently than those found in the large bowel. In this case we may have to make two diagnoses. I should say he certainly has diverticulitis of the stomach. He may have cirrhosis of the liver with esophageal varices.

DR. CHESTER M. JONES' DIAGNOSIS

Diverticulitis of the stomach.

Possibly cirrhosis of the liver with esophageal varices.

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**Discussion on Autopsy by Dr. Tracy B. Mallory, Boston**

There were two important findings, one of which was correctly diagnosed as a diverticulum of the stomach. This, I believe, however, was not the cause of the symptoms, but a large penetrating ulcer on the posterior surface of the duodenum, diving into the head of the pancreas. It was entirely on the posterior surface. Even at autopsy, palpatin the duodenum from the outside I was unable to feel the ulcer. I did not find it until I actually opened up the duodenum.

So far as the surgeon's note on the size of the liver is concerned, certainly thirty per cent of surgeons' notes on the condition of the liver at operation are entirely wrong according to post mortem examination. I very seldom trust them. It was a perfectly normal liver weighing 1700 grams. I do not think the surgeon was to be blamed in not feeling that ulcer in the duodenum, because it was on the posterior surface, practically buried in the head of the pancreas. There were a great many old adhesions, one of which ran from the transverse colon down into the inguinal ring. Another ran from the apex of the diverticulum to the lower pole of tht spleen. So that it is probable that this is a so-called traction diverticulum.

His heart was hypertrophied, 420 grams, slightly above normal. He had a moderate degree of arteriosclerosis and some scars in his aorta that were suggestive of syphilis. He had a hypostatic pneumonia and a local peritonitis just beneath the operative wound.

The kidneys were practically normal. They showed a relatively slight degree of arteriosclerosis.

There is one statement of Dr. Jones' that I disagree with, in reference to leiomyosarcoma. In a number of cases on record, which I have been looking up recently, diverticula were simulated by deep ulceration of an external myomatous tumor of the stomach.

ANATOMIC DIAGNOSES

1. Primary disease.

Duodenal ulcer.

2. Secondary or terminal lesions.

Diverticulum of the stomach.

Broncho-pneumonia.

Hypertrophy of the heart.

Arteriosclerosis.

DR. JONES: A surprising thing in this case is I think the fact that this man had such unusual pain, and that it was not referred to his back. When there is a duodenal ulcer, perforated, adherent in the region of the back, there almost always is pain in the back. This pain was epigastric, if anything higher up. It is strange he did not have more striking pain of penetrating ulcer. One thing we are sure of in the hospital is that a penetrating posterior duodenal ulcer is a difficult one to diagnose. The diagnosis usually is made because of the patient's symptoms in the face of the negative x-rays. We have had several cases lately in which the x-ray was negative or only suggestive of irritation in the duodenum, yet the patient's pain was out of proportion to the findings. There may be no tenderness on examination even with ulcer that is penetrating, or going on to perforation. It is surprising how little one can find in this type of ulcer.

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## AN HOUR WITH DR. CUREM

This play, written by members of the Woman's Auxiliary of the El Paso County Medical Society, and given to entertain visiting ladies at the meeting of the Medical and Surgical Association of the Southwest, in El Paso, November, 1930, was first presented before a meeting of El Paso clubs as a part of the Auxiliary's program to promote an interest in periodic health examinations. This activity of the Auxiliary follows a very effective campaign against hayfever in which the citizens and government of El Paso were stimulated to destroy all weeds within the city.

DRAMATIS PERSONAE

Miss Sweet, nurse.
Mrs. Ivan Ailment, hypochondriac.
Mrs. Sylly, operative case.
Mrs. Ima Wheeze, hay-fever patient.
Mrs. Fitz, epileptic.
Aunt Mandy, the colored nurse.
Marjorie Ann, the model child.
Mrs. Eat Moore, patient who diets.
Mrs. B. Swift, society woman.

*Scene: Dr. Curem's office, with nurse seated at*
*Enter Mrs. Ivan Ailment.*

*Nurse.* Name, please?

*Mrs. A.* Mrs. Ivan Ailment.

*Nurse.* Age?

*Mrs. A.* Do I have to tell that?

*Nurse.* Yes.

*Mrs. A.* Well—27.

*Nurse.* (*looks*) 27 Weight, please?

*Mrs. A.* Do I have to tell that, too?

*Nurse.* Yes.

*Mrs. A.* Well—120.

*Nurse.* (*looks*)' 120? Are your parents living?

*Mrs. A.* No.

*Nurse.* What caused your mother's death?

*Mrs. A.* I did—at birth. (*sobs*)

*Nurse.* What caused your father's death?

*Mrs. A.* Do I have to tell that?

*Nurse.* Well, we'd like to know.

*Mrs. A.* It wasn't anything catching.

*Nurse.* Well, what was it?

*Mrs. A.* He was hung!

*Nurse.* Have you any children?

*Mrs. A.* Yes—Ivan. Ivan is thirteen and so advanced for his age. Of course, he is only in the fifth grade, but he has been ill a great deal. And he has the sweetest nature—why, only yesterday, he threw the cat off the roof, and, when his father most unsympathetically reproved him for it, he—

*Nurse.* (*desperately*) Mrs. Ailment, have you ever had any contagious diseases?

*Mrs. A.* No, but Ivan had the worst case of scarlet fever ever seen in the city of New York.

*Nurse.* Have you had your tonsils out?

*Mrs. A.* Yes, my dear, and I never saw anything like it! I almost died. And they neglected me frightfully. I rang and rang and nobody came, and the doctor had gone to the theater. Imagine anyone going to the theater the same night he's almost killed a woman! Did you ever hear of anything so completely callous? And when they finally came, after almost five minutes, they gave me the silliest excuse. They said a woman had twins in the elevator!

*Nurse.* Have you had any other operations?

*Mrs. A.* No, but Ivan had his appendix out in June and I don't think he ought to be back in school but his father is most unsympathetic. I feel I ought to have my appendix out—it may be that that makes me feel so queer just here (*places hand on her side*) but I couldn't find a doctor in New York that realized how I suffered sometimes. None of them would operate; you know, I think they found some condition that won't let them operate and they just won't tell me, and my husband is so unsympathetic, you know how men are, you have to be dead before they think there is anything wrong, and he seems to think that, just because I dance all night and eat three or four good meals a day, I am perfectly strong. Well, here today and gone tomorrow—I wouldn't be surprised if he learned to his sorrow. So I don't know what's the matter with me. That's why I came for a general physical examination, but I am. I want to have my annual physical examina- without an x-ray picture and ten laboratory tests. (*Sits and waits for the doctor.*)

*Enter Mrs. Sylly.*

*Mrs. S.* Good morning, Miss Sweet.

*Nurse.* How are you by now, Mrs. Sylly?

*Mrs. S.* That's just what I came for—to see how I am. I want t have my annual physical examination to be sure nothing happens to me when I don't know about it. Why, they took me to the hospital on such short notice when I had my operation that I didn't even have time to worry about it.

*Nurse.* That's fine. Dr. Curem will see you in a few minutes.

*Mrs. S.* (*Takes chair.*)

(*Off stage*) *Kerchoo! Kerchoo! Enter Mrs. Ima Wheeze.*

*Mrs. Wheeze.* Good morning, Miss Sweet. Is the doctor in?

*Nurse.* Good morning, Mrs. Wheeze. The doctor is busy just now. Will you wait?

*Mrs. Wheeze.* Yes, thank you. I can sneeze as well here as at home.

*Nurse.* Isn't your hayfever any better since you have been taking the inoculations?

*Mrs. Wheeze.* Not a bit, but it might have been much worse without them. I react to so many things: dog hair, canary feathers, baked potatoes, even my husband's mustache brings on a violent attack. (*Sits down.*)

*Mrs. Ailment.* (*to Mrs. Wheeze*) Have you tried calcium?

*Mrs. Wheeze.* I have tried everything, (sneezes) the latest a solution of acid used to dissolve gold and after a few doses I dropped a bottle of it on the bath room floor and it dissolved the cement between the tiles.

*Nurse.* Perhaps the weeds near you need cutting. The city government, from the mayor down, are behind the weed eradication campaign.

*Mrs. Wheeze.* Yes, the weeds do need cutting, but since our mayor is to be a congressman, I'm afraid his head is above the weeds. (*Sneezes.*)

*Mrs. Sylly.* Have you had a general physical examniation? You may need an operation.

*Mrs. Wheeze.* Yes, Dr. Curem examined me thoroughly before I began my treatments.

*Enter Mrs. Fitz.*

*Nurse.* You wish to see the doctor ?

*Mrs. Fitz.* I wouldn't come here to see a movie. Is the doctor in now? I just wanted him to look at my finger (*holds up bandaged finger*) *and I don't* need a general examination.

*Nurse.* Your name, please?

*Mrs. Fitz.* Mrs. I. T. Fitz—F—I—T—Z.

*Nurse.* Your address?

*Mrs. Fitz.* 2400 Pain Ave.

*Nurse.* Thank you, Mrs. Fitz. Dr. Curem will see you, Mrs. Ivan Ailment.

(*Mrs. Ailment goes into private office.*)

*Nurse.* Do you know Mrs. Sylly, Mrs. Fitz?

*Mrs. Sylly.* Speaking of operations—when I had my operation I can remember going under the ether just as plainly as if it were today. There were so

many people around—doctors, nurses, relatives—I can't remember when I had so much attention before. It seemed like a public function instead of a private operation. To me, taking ether seemed the most serious step in life. When the doctor playfully said, "Now count with me—one, two, three, four," I felt like telling him a thing or two—that this was no time for play or foolishness—but the next thing I knew, I was sailing miles above everyone—way up in the cluods—saying one—two—three—four—how I wish there were more. I was having the time of my life up there when I suddenly realized I hadn't locked up the house and hadn't told my husband about my date with Hugo Eckner in the Graf Zeppelin. Then I got the sickest feeling.

*Mrs. Fitz.* How romantic!

*Mrs. Sylly.* —and when the thought came to me of the great expense of this venture, my head swam, but I consoled myself knowing that I would have a lot to talk about for the rest of my life. Everything went well for awhile at this dizzy height until landing time, when I said. "So this is heaven, no, it can't be, it doesn't smell like heaven, it smells like a hospital." And then I said, "Oh, how my Graf-Zeppelin hurts! It fels so empty! I guess those doctors didn't leave anything inside of me except my acoustics." Wasn't that killing? (*sighs*) *So now* I feel if they did so good a job as I think they must have, I'll never need fear catching anything else except, possibly, halitosis.

*Nurse.* Dr. Curem its ready for you, Mrs. Sylly. (*Mrs. Sylly goes to Doctor's office.*)

*Enter Aunt Mandy and Marjorie Ann*

*M. A.* Good morning, Miss Sweet.

*Nurse.* Good morning, Marjorie Ann.

*M. A.* This is my birthday and I have come in for my yearly physical examination.

*Nurse.* How fine! If all the boys and girls in El Paso would do that, we should have many more strong men and women. Dr. Curem will see you in a few minutes, just sit down.

*M. A.* Aunt Mandy, you've been promising to tell me how you saved your life with a pair of spectacles, for a week. Tell me while we wait.

*Mandy.* Law, chile, I dismember about dem spectacles and I done save my life so many times. You don't mean the time de baes and de goat tackled me and driv Marse Crawford unner de kitchen, does you?

*M. A.* No! No! They took you to the place where all the doctors were.

*Mandy.* Umm-huh. Now I sorter gins to git what youse drivin' at. If you'd des said "doctors" in de fust place I'd knowed what you meaned.

*M. A.* You reached out and took the spectacles off the table—don't you remember?

*Mandy.* Sholy I does! Sholy I does! Dis hyar story of mine dates way back bout muscadine time and it comes of my gittin' a muscadine seed lodge in my vermafuge pendulum. Well de muscadine seed lodge in my pendulum and de first news I gits of it, de misery ketch me unner de bottom rib on my right side and it stuck dere until I most nigh fergits how to woak on my heels. Dere was days when I couldn't no more den git up from me chair and when it come to doin' the cookin' or de washin' de misery was des scandulous. Den along come Dr. Bailey one day and he took a look at me and he press me hyah and he thump me dere and den he allow dat I got a muscadine seed lodge in my vermafuge pendulum. Honey, I was sholy scared! 'Cause Dr. Bailey is a man what knows de name of evahthing on de inside of a woman and he can cut a man's laig off wid his eyes shet and nevah even take de seegah outen his mouf, and when he let out 'bout dat muscadine seed and I knowed I'd been swallerin' em for forty years I most drapped in my tracks. From dat day on, de misery got worser and worser. (*Mrs. Wheeze is taken to the doctor by the nurse*). Den dey took me into town and 'low dey gwine have de seed distracted from whah it done lodge. Dey say dey ain't gwine do nothing 'til dey git me sorter conditioned up. Den one day eveybody is a-walking' round dey tiptoes and a-whisperin' and de air is just nachully heavy wid trouble. I see de doctors in de odder room movin' things yonder; and a-spreadin' a white cloth and a-washin' dey hands in a chiny bowl. So when Lucy Ann come by, I say, "Lucy Ann, is de doctors in de udder room gittin' mah dinner ready? Seems lak to me I hyah de clink of dishes and Dr. Muckhat got a carvin' knife in his hand." "Dinah," says she, "deys gittin ready to perform on a sick woman." "Lucy Ann," says I, "is dey any body sick here but me?" "N obody but you," 'spons she. So den I knowed if dere wasnt anybody sick here but me dat all dat gittin' ready was for me. So I sit in de bed and recah ovah and grab my spectacles off the table and clap 'em on. And just then the doctor is opening a big black box and takin' out long curious knives,—and saws—and whenches wid twisted handles. And de young doctor say, "Well, dey ain"t much chance for the niggah, but guess we better cut her open and see what ails her." Well, chile, I knowed dat wasn't no place foh me. So I slip out of bed and grab my clothes and drap outen dat winder like a wet towel. I hit de groun' a runnin'" and tuk de main road out of town. I look back and see a shadder followin' and I done lead dat shadder plumb home. I didn't know I was dere until I hit my head fo'most 'ginst de back doah. I ain't never been so shuck up in all my bo'n days as when I hit dat back doah, 'cept when I look fru dat doah expectin' to see a layout foh dinnah and see dem performin' instruments.

*M. A.* But, Aunt Mandy, what became of the muscadine seed?

*Mandy.* Well, honey, I reckon when I hit dat back doah head fo'most I just natchally must have swallowed it fudder. When a woman gits to de point whah she can't tell de diffunce twixt performin' instruments and a layout for dinnah wid de nakud eye, it's time to tie de spectacles on; and anyhow dat's how de spectacles save my life.

*M. A.* Why didn't you want them to operate on you, Aunt Mandy?

*Mandy.* I don't believe in operations. Even de scriptures is agin it. Don' de Bible say plain and flat, what God has jined together let no man put asunder!!

*Enter Mrs. Eat Moore.*

*Nurse.* May I have your name, please?

*Mrs. E. M.* Mrs. Eat Moore.

*Nurse.* And address?

*Mrs. E. M.* 100 Ease Street.

*Nurse.* Your symptoms, please?

*Mrs. E. M.* I haven't any. I am looking for a doctor who can make me look my thirty years and no more. I haven't had a bit of cake, candy, or anything sweet this entire summer; I have almost lived on tomato juice, bran, sauerkraut, pineapple, lamb chops, spinach, and life savers, and have gained 25 pounds. As a last effort to reduce I am inventing a perambulating bridge table—and here, this morning, as I came through the park a man kept following me everywhere I went. Finally I stopped and said, "'What do you mean following right in my tracks, you tramp? If you don't go away I am going to call a policeman." He said, "Oh, lady, please don't do that, this is the first shady spot I have found for weeks. Please have a heart." I want a perscription to reduce. (*Nurse hands her a fan and indicates a chair.*)

*Nurse.* I'm sure Dr. Curem can help you; he will see you soon.

(*Nurse takes Mrs. Fitz in to Dr. Curem. Mrs. Fitz drops note.*)

*Nurse* (*finds note on the floor on her return and reads*: "To anyone who finds this: If I should fall on the street and have to have a doctor, please don t remove my appendix. It has already been taken out twice. This is just an ordinary epileptic fit. I have them all the time." (*Nurse smiles and puts note away.*)

*Enter Mrs. Swift.*

*Mrs. Swift.* I'd like to see Dr. Curem.

*Nurse.* He can see you soon, I am sure. Won't you have a chair?

*Mrs. Swift.* I had an appointment with the doctor for my annual physical examination and I am sure he is waiting to see me right now, because the appointment was for a half hour ago. I had an examination here last year and I am sure I can't think why I do it again for it led to such a lot of trouble. Why, they discovered I had neuritis and before I got through I had eight teeth out and was taking salicylate three times a day. Of course, it did cure the neuritis, but I'd almost as soon suffer with that as to miss the Annual Woman's Club Luncheon, which I had to do because I couldn't eat. My dear, imagine how I looked! I have two other engagements for this morning and I simply cannot wait. If I am late at the Beauty Shop, Celeste simply will not take me.

*Nurse.* I will tell the doctor you are here, Mrs. Swift. (*Mrs. Swift impatiently stands as nurse goes to office.*)

*Mrs. Eat Moore.* If you had started an hour before, you might not have to hurry so fast.

*Mrs. Swift.* And if I had left later, I might not have had to wait for the doctor now.

*Mrs. Eat Moore.* Mrs. Ailment, will you tell the nurse I had to go down for an ice cream soda. I'll be right back.

*Nurse.* (*returns*) Dr. Curem will see you, Marjorie Ann. (*Mandy and child exeunt.*)

*Mrs. Swift.* Well! No wonder he has such an odd class of patients if he deliberately offends the social leaders. My time can certainly be spent in a more valuable way than waiting for a health examination in a doctor's office. (*Flounces out.*)

*Mrs. Ivan Ailment.* What a pity that anything should be more important than health.

*Nurse.* Yes. So many people have time for everything and still fail to give attention to the one thing which you cannot replace—health!

(*Curtain*)

## TRUTH ABOUT MEDICINES

### PROPAGANDA FOR REFORM

**The Stroopal Fraud.**—For many years a nostrum known as Stroopal has been sold on both sides of the Atlantic as a cure for Cancer. The product apparently originated in Germany. For some years it was exploited from London and was exposed by London *Truth* nearly twenty years ago. According to Gehe's Codex, Stroopal is composed of the powdered leaves of *Teucrium Scordium*, otherwise known as water germander or wood garlic. For at least seventeen years, Stroopal has been exploited in a small way from Chicago. Recently, Stroopal seems to have been advertised under the name of the Stroopal Company, 2101 Belmont Ave., Chicago. On August 13, the postal authorities issued a fraud order against the Stroopal Company and notified the Chicago postmaster to return all letters addressed to the Stroopal Company to the original senders. (Jour. A.M.A., October 4, 1930, p. 1037).

**The Pavia "Cancer Cure."** — During the past year, editors of newspapers and magazines have received from one Burroughs F. Perry of 221 Shoreland Arcade, Miami, Florida, a piece of mimeographed publicity material headed, "Cancer and Goiter Cure is Asserted." The statement is to the effect that one Charles Pavia has discovered a wonderful cure for cancer and goiter! Further, according to Mr. Perry's material, the Pavia formula "feeds the cancer germs, satisfies it and destroys it by self-satisfaction.' The main exploiter of Pavia's remedy seems to be one R. B. Fisher, whose staticnery announces him to be an attorney; he, too, does business from 221 Shoreland Arcade, Miami. At the request of Pavia and Fisher, Dr. Charles D. Cleghorn, president of the Dade County (Miami, Fla.) Medical Association, checked up on cases treated with Pavia remedy and reported that in three cases examined the treatment had been quite without effect. Dr. Cleghorn reports that the description of the formula, as given him, was "vegetable oils, camphor, menthol and turpentine in a base of animal fats." Chemists of the A. M.A. Chemical Laboraory reported that the remedy was a brownish yellow ointment with a terebinthinate odor, indicating the presence of turpentine, menthol and camphor. It may well be that Mr. Pavia is sincere in his exploitation of the remedy. However, a worthless cancer remedy sincerely exploited may prove just as fatal as the crudest of cancer cure swindles. (Jour. A.M.A., October 11, 1930, p. 1116).

**The Advertising of the Dentifrice.** — The early part of the twentieth century may be interesting historically for the fact that it witnessed the apothosis of the toothbrush, the toothpaste and the mouthwash. So far as mouthwashes are concerned, their virtues may lie in a slight astringency or alkalinity, in the mildly antiseptic influence they exert for a brief period, or more probably in the fact that they contain enough water to provide a lavage appealing to the organoleptic senses. "Halitosis" gave to Listerine a sales impulse that no other mouthwash has ever been able to equal. The fact that the combination of substances included in Listerine is relatively ineffective and will not cure halitosis did not lessen the sales impulse. Recently, the Food and Drug Administration has cast a critical eye over the claims for antiseptic value made for the various mouthwashes and gargles. It is currently reported that the owners of all these bringers of gold are rushing hither and thither to the laboratories searching for substances that really are antiseptics and that can be added to their concoctions without changing taste or color—the important qualities—that the claims may be justified. Recently, dentifrices have been widely exploited with various claims. A half-dozen assorted chemists and the commissioner of health of New York assert that low surface-tension means that a toothpaste will penetrate better between the teeth. The claim of special value because of low surface-tension in connection with the selling of any toothpaste is one hundred per cent hookum. Any mixture of soap, glycerin and chalk, such as is available in many toothpastes, would be equally endowed with a low surface-tension. The council on dental therapeutics of the American Dental Association is now making efforts to secure restriction of the claims for dentifrices and physicians should do all that they can to aid the American Dental Association in this campaign. (Jour. A.M. A., October 25, 1930, p. 1267).

# Southwestern Medicine

Printed by THE A. C. TAYLOR PRINTING CO., Phoenix, Arizona
Published monthly for the Board of Managers of the four constituent societies.

Volume XV | FEBRUARY, 1931 | No. 2

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## PROPOSED BASIC SCIENCE BILL IN ARIZONA

The Arizona State Legislature is considering a Basic Science bill, similar to that which has proved satisfactory in several other states. This bill, prepared by the Committee on Welfare of the Arizona State Medical Association, was introduced in the Senate by Senator T. J. Bouldin, of Navajo County. Before this journal is in the mails this proposed legislation may have been disposed of some way. However, for the information of those interested, the bill is printed below. Whether or not it passes physicians of Arizona are urged to make themselves familiar with this bill. If the legislature should fail to pass this act, it will be on account of lack of education as to its merits. Any educational program in this connection must be conducted by the medical profession and must aim to bring otherwise disinterested legislators to a sense of the importance of protecting the public from unqualified persons, who find the credulity of the average individual with regard to sickness and the treatment of disease a fertile field for exploitation.

The medical profession of Arizona could learn a valuable lesson from the dentists. Many months before the legislature convened they had their proposed bill drawn, copies made and distributed to every dentist in the state, and each of these was asked to interview the elected members of the legislature before they convened. The text of the Basic Science Bill is as follows:

Section 1. BASIC SCIENCE CERTIFICATE REQUIRED. No person shall be eligible for examination or permitted to take an examination for a license to practice the healing art or any branch thereof, or granted any such license, unless he has presented to the licensing board or officer empowered to issue such license, a certificate of ability in anatomy, physiology, chemistry, bacteriology, pathology and hygiene (hereinafter referred to as the basic sciences) issued by the State Board of Examiners in the basic sciences.

Section 2. THE HEALING ART DEFINED. For the purposes of this Act any license authorizing the licentiate to offer or undertake to diagnose, treat, operate on or prescribe for any human pain, injury, disease, deformity or physical or mental condition is a license to practice the healing art.

Section 3. BOARD OF EXAMINERS IN THE BASIC SCIENCES; APPOINTMENT AND PERSONNEL. The Governor shall appoint a State Board of Examiners in the basic sciences (hereinafter referred to respective appointments. On the expiration of the term of any mmeber, the Governor shall fill the vacancy by appointment for a term of five years. On the death, resignation or removal of any member, the Governor shall fill the vacancy by appointment for the unexpired portion of the term. Every member shall serve until his successor is appointed and qualified. The members of the Board shall be composed of persons having special knowledge and education in the basic sciences aforesaid. Any professor in the University of Arizona, or in the State Teachers College at Tempe or Flagstaff, Arizona, who are active teachers in any of the basic sciences, that is, anatomy, physiology, chemistry, bacteriology, pathology and hygiene are eligible for appointments on this board as well as practitioners of any school who are versed in these basic sciences..

Section 4. ORGANIZATION OF BOARD — ELECTION OF OFFICERS, SEAL, RULES, COMPENSATION. The board shall meet and organize as soon as practicable after appointment. It shall have power to elect officers, to adopt a seal, and to make such rules as it deems expedient to carry this act into effect. The Board shall keep a record of its proceedings, which shall be conclusive evidence of all matters contained therein. Each member of the board shall receive twenty dollars per diem and actual expenses, when actively engaged in the discharge of his duties. The compensation

(Continued on page 90)

## PUBLIC HEALTH NOTES

J. ROSSLYN EARP,
Director New Mexico Bureau of Health

### STATE PUBLIC HEALTH LABORATORY

The State Public Health Laboratory at Albuquerque reports a large volume of work accomplished in the twelve-month period, December 1, 1929, to November 30, 1930, no less than 16,222 specimens having been examined. This service has been most economically conducted at a cost to the state of approximately $7,500. At current prices a private laboratory would have charged $46,248 for the same work. The laboratory has thus saved the State a sum of money in excess of the whole annual appropriation of the bureau of health.

The following table shows in detail the nature of the laboratory work accomplished:

| | |
|---|---|
| Diphtheria cultures | 4,942 |
| Feces (Typhoid) | 1,026 |
| Gonorrhea | 447 |
| Miscellaneous | 741 |
| Rabies | 17 |
| Tuberculosis | 207 |
| Wassermanns (Syphilis) | 2,801 |
| Kahn tests (Syphilis) | 2,755 |
| Spinal fluid | 42 |
| Water | 1,287 |
| Widals (Typhoid) | 431 |
| Paratyphoid | 853 |
| Undulant fever | 153 |

The laboratory is anxious to receive wet blood specimens for the Widal test. This not only gives a more reliable test for the diagnosis of typhoid fever but enables the laboratory to run at the same time an agglutination test for undulant fever.

### UNDULANT FEVER

Investigations of sample herds of goats and of dairy herds have proved that both Br. melitensis and Br. abortus are abundantly present in the animal population of New Mexico. That human infection is equally common must not be concluded. The recent report[1] from the League of Nations on undulant fever comments on the frequency with which milk is found to be contaminated with Br. abortus and the comparative rarity of human infection. It goes on, however, to stress the experiments of Burnet showing that Br. melitensis is decidedly more pathogenic for man than is B. abortus. Moreover, it has been a common experience throughout the world that, when animal infection has been detected and the attention of the medical profession drawn to this fact, human cases have subsequently been discovered in increasing numbers. If the profession in New Mexico will forward to the state laboratory wet blood specimens in every case of suspicious fever, it is possible that the notification of this disease will show an increase.

### PELLAGRA

The Santa Fe County Medical Society, at its meeting on January 13, spent some time in swapping stories of cases of pellagra that have recently been treated by its members. Pellagra is one of the preventable diseases. It is entirely within our means, by the adequate use of pellagra preventive foods, to abolish the disease entirely. Yet there were more than 6,500 deaths from pellagra in the United States last year. This must be attributed largely to ignorance and partly to poverty—for an adequate diet is not possible to some of the victims even though they knew of its need.

The richest food in the P-P factor (formerly included in Vitamin B, now sometimes called Vitamin E) is dried yeast. One-half to one ounce taken daily will prevent pellagra or cure it in any but the penultimate stages. There is no reason why yeast should be so expensive as it sometimes is when bought in tablet form from the drug store.

The pellagra preventive foods known at the present time are: fresh lean beef, fresh milk or buttermilk, liver, eggs, and canned salmon. Tomatoes have also been approved. No doubt in the next few years this list will be considerably extended.

(1) Monthly Epidemiological Report of the Health Section of the Secretariat Geneva, October 15, 1931, page 413.

## PANORAMIC VIEW OF THE WOMAN'S AUXILIARY TO THE A.M.A. IN FOUR ARTICLES

### I. THE EASTERN DISTRICT.

MRS. W. WAYNE BABCOCK

According to the Constitution of the National Auxiliary, the first Vice-President is automatically chairman of organization, the three other Vice-Presidents being organizers for their section of the country. Mrs. Southgate Leigh, of Virginia, therefore, holds this chairmanship, and the Eastern District is her particular responsibility. At her request a series of four articles is being prepared by her committee in order that each district may be cognizant of the progress of its own states, as well as that of the other three sections. The individual state journals have been generous in extreme in the space they have allowed their auxiliaries and this additional courtesy of reporting the auxiliary situation in other states is deeply appreciated, for there is a growing desire to know "what others are doing."

New Hampshire stands alone as the only New England state 100 per cent organized and cooperating with the National Organization. Last year the state auxiliary had misgivings as to its necessity and useful-

ness, but an urgent request from the medical society that the women remain organized, dispelled all doubts. During the year following, Mrs. Hubbard, wife of the State President, visited every county, which encouraged and stimulated the growth of unit auxiliaries.

The New Jersey Auxiliary made pilgrimages to state institutions, set apart one meeting when the mothers of physicians were entertained, and sponsored various health meetings. The Essex County Auxiliary, assisted by the physicians, succeeded in establishing a course of health talks,in cooperation with the Y.M.C.A. of Newark, emphasizing especially prenatal care and information which would aid the mothers of babies and young children. Last year Mrs. James Hunter, Jr., New Jersey's State President, visited every county, as did Mrs. Walter Jackson Freeman in Pennsylvania, during her presidency. One cannot help drawing the conclusion that personal contacts are necessary for county development and success.

Virginia is active in spots. The doctors encourage the auxiliaries as they believe that through them education with regard to the menace of state medicine can be spread.

Ohio for several years has been sending representatives from a few organized counties to the national meetings, but as yet there is no state organization. As our friend and advisor, Dr. Upham, lives in Ohio, it is felt that he will advise the National Auxiliary when the auspicious time arrives for the establishment of a State Auxiliary.

The District of Columbia seems so completely diverted with Washington affairs that the auxiliary which so capably cared for the A.M.A. meetings some years back, seems to have gone into retirement.

Delaware, in a breathless, better-late-than-never manner, has completely caught up and is most interested and active and has entered upon serious work by assisting the men of the profession in establishnig a medical library in Wilmington. They will cooperate with Philadelphia at the time of the A.M.A. and the eastern section will introduce them with pride to the national organization. West Virginia is up and doing and you may expect still better things from that state this year.

Maine, Massachusetts, Rhode Island, Vermont and Maryland have reported the interest of individuals but no organized effort. Queries from different localities in New York as to why there is no auxiliary, have been answered with the statement that several years ago the House of Delegates voted unanimously in favor of the auxiliary and authorized its organization. The same year, Connecticut voted favorably but no definite steps have been taken.

Pennsylvania has surely discovered the rhythm in which its auxiliary work is best done, for concrete accomplishments have been turned out regularly, year by year. Of the three thousand dollars contributed last year to the Medical Benevolence Fund, more than two-thirds was contributed by the Auxiliary. A definite trend toward educational meetings is felt all over the state and socially it is hoped that the carefully formed Philadelphia plans for the next meeting will bring honor and glory to the Keystone State. Not only are the adult members of the auxiliary meeting but a group of the most charming and good-looking daughters of doctors are working together in order that they may know each other and work in unison for the comfort and pleasure of the A.M.A. guests when they come to Philadelphia in May. Verily, who can question the wisdom of the auxiliary, when it brings about so much willing work in behalf of the medical men of the country?

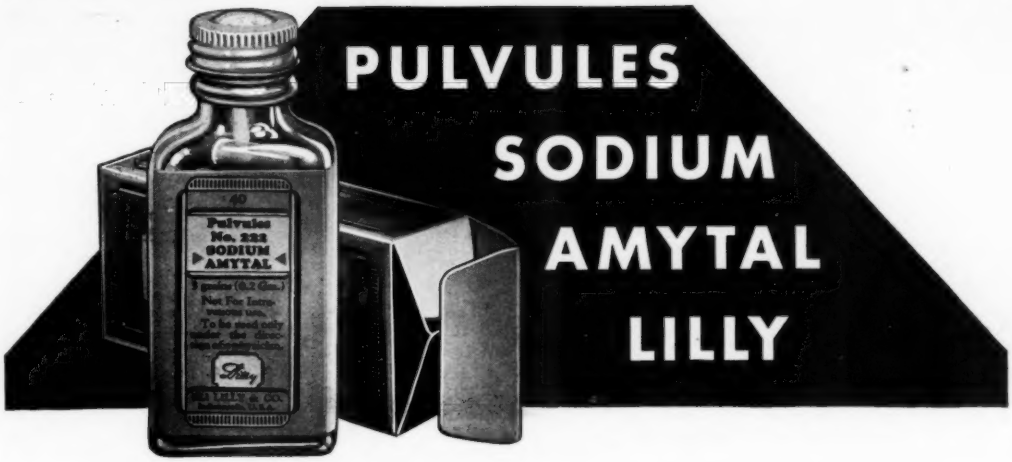
## PROPOSED BASIC SCIENCE BILL IN ARIZONA

(Continued from page 88)

of the members and other expenses of the board shall be paid out of the fees received from applicants, but this is not to be construed as preventing appropriations to cover deficits. The treasurer of the board shall give such bond, running in favor of the state, as the state treasurer shall determine. The office of the board shall be in the state capitol building or any other building occupied by the state government.

Section 5. FEES PAYABLE BY APPLICANTS. The fee for examination by the board shall be ten dollars. The fee for re-examination within any twelve month period as hereinafter provided shall be five dollars, but the fee for re-examination after the expiration of twelve months shall be the same as the original fee. The fee for the issue of a certificate by authority of reciprocity on the basis of qualifications as determined by the proper agency of some other state, shall be ten dollars. All fees shall be paid to the board by the applicant at the time of filing application. The board shall pay all money received as fees into the state treasury, to be placed in a special fund to the credit of the board. The treasurer shall pay out of such fund or any appropriation made therefor all expenses incurred by the board, on vouchers signed by the president and secretary of the board.

Section 6. EXAMINATIONS. The board shall conduct examinations at such times and places as it deems best, but such examinations shall be held at least once a year. Every applicant except as hereinafter provided, shall be examined to determine his knowledge, ability and skill in the basic sciences. The examination shall be conducted in

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writing, but may be supplemented by an oral examination in the laboratories. If the applicant received a credit of seventy-five per cent or more in each of the basic sciences, he shall be considered as having passed the examination. If the applicant received less than seventy-five per cent in one subject, and receives seventy-five per cent or more in each of the remaining subjects, he shall be allowed a re-examination at the examination next ensuing on application and the payment of the prescribed fee; but he shall be required to be re-examined in all branches. If the applicant shall receive less than seventy-five per cent in more than one subject, he shall not be re-examined within the period of one year next following his original examination, nor unless he presents proof satisfactory to the board of additional study in the basic sciences sufficient to justify re-examination.

Section 7. REQUIREMENTS FOR CERTIFICATE. No certificate shall be issued by the State Board of Examiners in the basic sciences unless the person applying for a certificate submits evidence satisfactory to the board: (1) That he is not less than twenty-one years of age; (2) that he is a person of good moral character; (3) that he was graduated by an accredited high school or school of similar grade, or possessed of educational qualifications equivalent to those required for graduation by such accredited high school before he began the study of the healing arts, and (4) that he has a comprehensive knowledge of the basic sciences as shown by passing the examination given by the board as by this Act required.

Section 8. RECIPROCITY. The State Board of Examiners in the basic sciences may in its discretion waive the examination required by Section 7, when proof satisfactory to the board is submitted, showing that the applicant has passed the examination in the basic sciences before a board of examiners in the basic sciences or a board authorized to issue licenses to practice the healing are in another state, when the requirements of that state are, in the opinion of the board, not less than those provided by this Act. The provisions of this section shall apply only to examinations conducted by the boards or officers of states that grant like exemption from examination in the basic sciences to persons granted certificates by the board of this state.

Section 9. APPEAL FROM BOARD'S DECISION. Any applicant who has been denied examination by the board may within thirty days after such denial appeal to the Superior Court of Maricopa County; and such court shall on such appeal inquire into the cause of such denial. If in the opinion of the court admission to examination was refused without just cause, the court may order the board to examine the applicant. Notice of an appeal from the denial of the board of the right to examination must be in writing and be served on any member of the board by leaving with him at his usual place of business or abode a copy thereof within thirty days after said board has notified the applicant of its refusal to examine him. Hearings of such appeals shall proceed in accordance with the law and under such rules as the said Superior Court may determine.

Section 10. CERTIFICATES AND LICENSES VOID. Any basic sciences certificate and any license to practice the healing art or any branch thereof, which is issued contrary to this act shall be void. Any board or other body which has issued a license to practice a healing art by virtues of a void basic science certificate shall revoke or cancel such license. The procedure for such revocation or cancellation shall be in accordance with the provisions of the act under which such license was issued, for the cancellation or revocation of licenses generally. The certificate issued to any person by the state board of examiners in the basic sciences shall be automatically revoked by the revocation of any license issued to such persons to practice the healing art or any branch thereof.

Section 11. PRACTICE WITHOUT BASIC SCIENCE CERTIFICATE. Any person who shall practice the healing art, or any branch thereof, in the state of Arizona without having obtained a valid certificate from the state board of examiners in the basic sciences, except as otherwise authorized by this Act, shall be guilty of a misdemeanor and punishable by a fine of not less than fifty dollars ($50.00) nor more than five hundred dollars ($500.00), or imprisonment in the county jail for not less than thirty days or more than six months, or by both such fine and imprisonment.

Section 12. PENALTY FOR OBTAINING OR ATTEMPTING TO OBTAIN FRAUDULENT CERTIFICATE. Any eprson who shall obtain, or attempt to obtain a basic science certificate by any dishonest or fraudulent means, or who shall forge, counterfeit or fraudulently alter any such certificate shall be guilty of a misdemeanor and punishable by fine of not less than one hundred dollars ($100.00) nor more than one thousand dollars ($1000.00,) or imprisonment in the county jail for not less than three months nor more than six months, or by both such fine and imprisonment.

Section 13. PENALTY FOR OBTAINING OR

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Superintendent

ATTEMPTING TO OBTAIN LICENSE TO PRACTICE THE HEALING ART.. Any person who shall obtain, or attempt to obtain, a license to practice the healing art, or any branch thereof, from any board authorized to issue any such license without presenting to said licensing board a valid certificate issued by the State Board of Examiners in the basic sciences as required by this act shall be guilty of a misdemeanor and punishable by a fine of not less than one hundred dollars ($100.00) nor more than one thousand dollars ($1000.00) or imprisonment in the county jail for not less than thirty days nor more than six months, or by both such fine and such imprisonment.

Section 14. PENALTY FOR ISSUANCE OF FRAUDULENT LICENSE. Any person who knowingly issues, or participates in the issuance of a license to practice the healing art, or any branch thereof, to any person who has not presented to the licensing board a valid certificate from the State Board of Examiners in the basic sciences, or to any person who has presented to such licensing board any such certificate or certificates obtained by dishonesty or fraud, or any forged or counterfeit certificate shall be guilty of a felony, and punishable by fine of not less than five hundred dollars ($500.00) or more than five thousand dollars ($5,000.00), or by imprisonment in the state prison for not less than one year nor more than five years, or by both such fine and such imprisonment.

Section 15. FEES PAID UNAUTHORIZED PRACTITIONERS RECOVERABLE. Any money paid out by any person as compensation for services rendered in the practice of the healing art or any branch thereof to any person not validly licensed to practice such healing art or branch may be recovered by the person who has paid such money by a suit instituted within two years from the date when such fee or compensation was paid.

Section 16. ENFORCEMENT. The State Board of Examiners in the basic sciences and the various boards authorized to issue licenses to practice the healing art or any branch thereof, shall investigate any reported violation of this act and report to the proper county attorney all the cases that in the judgment of such board warrant prosecution. It shall be the duty of the attorney general of the state to prosecute or supervise the prosecution of violation of this act.

Section 17. EXCEPTIONS. This act shall not be construed as applying to dentists, nurses, midwives, or optometrists, practicing within the limits of their respective callings, nor to other persons licensed to practice the healing art or any branch thereof in this state when this act takes effect; nor to persons specifically permitted by law to practice without licenses, practicing within the limits of the privileges thus granted to them.

Section 18. SAVING CLAUSE. No provision of this act shall be construed as repealing any statutory provision in force at the time of its passage with reference to the requirements governing the issuing of licenses to practice the healing art or any branch thereof; but any board authorized to issue licenses to practice the healing art or any branch thereof, may in its discretion accept certificates issued by the board of examiners in the basic sciences in lieu of examining applicants in such sciences as heretofore.

Section 19. UNCONSTITUTIONALITY OF ONE PART DOES NOT AFFECT ANY OTHER PART. Should any part or parts of this Act be declared to be unconstitutional, such declaration shall not have the effect of invalidating any other part thereof.

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Section 20. SHORT TITLE. This Act may be cited as "Basic Science Act, 1931."

Section 21. Whereas, the purpose and intent of this Act is to assure and make certain a just and humane law in the State of Arizona for the protection of the citizens from the practices of uneducated and incompetent practitioners of the healing art or any branch thereto, and

Whereas, the preservation of the public peace, health and safety makes it necessary that the provisions of this Act shall become operative immediately, an emergency is hereby declared to exist and this Act is, therefore hereby exempt from the operation of the referendum provisions of the state constitution and shall take effect and be in full force and effect from and after its passage and its approval by the Governor."

## TRUTH ABOUT MEDICINES

### New and Nonofficial Remedies

The following products have been accepted by the Council on Pharmacy and Chemistry of the American Medical Association for inclusion in New and Nonofficial Remedies:

**Diphtheria Toxoid.**—This product (Jour. A.M.A., November 15, 1930, p. 1505) is also marketed in packages of ten immunization treatments containing two 1 cc. vials of diluted diphtheria toxoid for the reaction test and twenty 1 cc. vials of diphtheria toxoid for treatment; in packages of fifteen immunization treatments contaniing one 1 cc. vial of diluted diphtheria toxoid for the reaction test and one 30 cc. vial of diphtheria toxoid for treatment. Lederle Laboratories, Inc., Pearl River, N. Y.

**Tetanus Gas Gangrene Antitoxin** (Lederle) Refined and Concentrated.—An anaerobic antitoxin (New and Nonofficial Remedies, 1930, p. 343), prepared by immunizing horses with gradually increasing doses of the toxins of B. tetani, B. perfringen, and Vibrion septique. The toxins are individually prepared. The product is marketed in packages of one syringe containing one prophylactic dose, stated to represent tetanus antitoxin, 1,500 units, perfringens antitoxin 1,000 units and Vibrion septique antitoxin 10 units. Lederle Laboratories, Inc., Pearl River, N.Y.

**Gas-Gangrene Antitoxin** (Polyvalent) Refined and Concentrated. Without Tetanus Antitoxin. An anaerobic antitoxin New and Nonofficial Remedies, 1930, p. 343) prepared by immunizing horses with subcutaneous injections of gradually increasing doses of the toxins of B. perfringens, Vibrion septique, B. oedematiens, B. sordelli and B. histolyticus. The toxins are individually prepared. The product is marketed in vials containing one minimum therapeutic dose, stated to represent perfringens antitoxin 10,000 units, Vibrion septique antitoxin 100 units, B. oedematiens antitoxin 200 units, B. sordelli antitoxin 200 units, and B. histolyticus antitoxin 25 units. Lederle Laboratories, Inc., Pearl River, N.Y.

### PROPAGANDA FOR REFORM

**Avesan (H) Not Acceptable for N.N.R.**—The Council on Pharmacy and Chemistry reports that Avesan (H), according to the Avesan Chemical Co., Los Angeles, is "Indicated in tuberculosis, asthma, bronchitis and bronchiectasis" and stated to be "Effective in minor disturbances of the respiratory organs." The product is supplied in ampules and is administered subcutaneously. It is stated to be "a purely chemo-therapeutical product" which is "composed of formic acid, sodium nucleinate, camphor, allyl sulphide and chlorophyl with traces of salicin and sulphuric ether." After considering the


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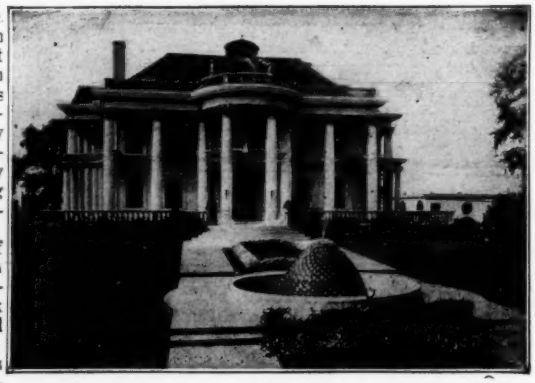

S. came to us with an advanced case of typical tabo-peresis. He was treated with the classical Swift-Ellis, intraspinal, therapy and in three months returned to work symptomatically cured and has remained so for fifteen yeors.

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G. Wilse Robinson, Jr., M.D.
Associate Medical Director

G. WILSE ROBINSON, M.D.
Medical Director
1432 Professional Building
8100 INDEPENDENCE ROAD
KANSAS CITY, MO.

Drug and Alcohol Addiction

Paul A. Johnson, M.D.
Internist

available evidence and information, the Council declared Avesan (H) inadmissible to New and Nonofficial Remedies because no acceptable evidence for the efficacy and rationality is presented, because unwarranted claims are made, and because no evidence was supplied to show that the composition and uniformity of the preparation are adequately controlled. (Jour. A.M.A., January 3, 1931, p. 39).

**Therapeutic Potentialities of "Mustard Gas."** — From time to time hopes are still entertained for some possible usefulness in medicine of "mustard gas," chemically known as dichlorethylsulphide. British and German investigators report that the dermal application of dichlorethylsulphide will prevent the development of the experimental cancer of tars. Forster of the Pharmacologic Institute at Wurzberg has reported that dichlorethylsulphide in high solution was the most efficient hair growth promoter of a considerable number of agents tried. Quantitative estimations of hair growth on shaved cats, treated locally with concentrations of 0.01 per cent of the compound in fifty per cent alcohol containing 2 per cent of glycerin, showed a much greater production of hair than with other substances used. Impure yellow petrolatum, but not the pure white product, was next in efficiency to dichlorethylsulphide, this being attributed to impurities acting as irritants. Forster found that when agents are used that cause excoriation a diminution or inhibition of hair growth occurs, and he suggests that this may also occur after injudicious application of dichlorethylsulphide. Lest the results of this research on hair tonics in felines arouse premature hopes in the bald and near bald, it should be mentioned that not all shaved and bald skins responded equally well. Nor are all "war gases" necessarily effective, for the German cats, in Forster's hand, frankly declined to respond to the much vaunted "war gas" of the Allies. (Jour. A.M.A., January 3, 1931, p. 41).

**First Aid by the Manufacturer.**—Doctors received during the Christmas season, a copy of the pamphlet entitled "First Aid and Emergencies," prepared by McKesson and Robbins for circulation to the public. It is not surprising to find from consultation of this pamphlet that first aid covers a wide variety of conditions and that apparently McKesson and Robbins have developed something for each of these conditions. Thus, anemia is listed among the conditions demanding first aid and the patient is given full instructions for its control. In addition, biliousness and liver trouble, Bright's

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disease, diabetes, eczema, gout, rheumatism and tuberculosis are among the conditions demanding first aid. True, the book mentions in various places the desirability of calling a physician, but the patient is encouraged to take a chance. This pamphlet represents one of the worst phases of proprietary medicine business. (Jour. A.M.A., January 3, 1931, p. 44.)

### VITAMIN ADVERTISING AND THE MEAD JOHNSON POLICY

The present spectacle of vitamin and irradiation advertising running riot in newspapers and magazines and via radio emphasizes the importance of the physician as a controlling agent in the use of vitamine products. Mead Johnson & Company feel that vitamin therapy, like infant feeding, should be in the hands of the medical profession, and consequently refrain from exploiting vitamins to the public.

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